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COMPTE RENDU DU

Forest Pest Management

FORUM

sur la répression des ravageurs forestiers

2010

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I. Service canadien des forêts
II. Titre.
III. Titre : Compte rendu du Forum sur la répression des ravageurs forestiers 2010.

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Committee Members

STEERING COMMITTEE / COMITÉ D'ORIENTATION

Anthony Hopkin, *Chair*
Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre /
Ressources naturelles Canada, Service canadien des forêts, Centre de foresterie des Grand Lacs

David Carmichael
Prince Edward Island Department of Environment Energy and Forestry

Lise Caron
Natural Resources Canada, Canadian Forest Service, Laurentian Forestry Centre/
Ressources naturelles Canada, Service canadien des forêts, Centre de foresterie des Laurentides

Nelson Carter
New Brunswick Department of Natural Resources/
Ministère des Ressources naturelles du Nouveau-Brunswick

Marcel Dawson
Canadian Food Inspection Agency/
Agence canadienne d'inspection des aliments

Tim Ebata
British Columbia Ministry of Forests and Range

Jim Evans
Newfoundland Department of Natural Resources

Rich Fleming
Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre/
Ressources naturelles Canada, Service canadien des forêts, Centre de foresterie des Grand Lacs

Jacques Gagnon
Natural Resources Canada, Canadian Forest Service, National Capital Region/
Ressources naturelles Canada, Service canadien des forêts, Région de la capitale nationale

Mike Gravel
Government of the Northwest Territories

J. Edward Hurley
Natural Resources Canada, Canadian Forest Service, Atlantic Forestry Centre/
Ressources naturelles Canada, Service canadien des forêts, Centre de foresterie de l'Atlantique

Committee Members

Michael Irvine
Ontario Ministry of Natural Resources – Pesticides Minor Use/
Ministère des Richesses naturelles de l'Ontario – Une personne d'usage limité des pesticides

Robert Legare
Yukon Government

Bonnie Macleod
Health Canada, Pest Management Regulatory Agency/
Santé Canada, Agence de réglementation de la lutte antiparasitaire

Rory McIntosh
Saskatchewan Ministry of Environment, Forest Services Branch

Ben Moody
Natural Resources Canada, Canadian Forest Service, National Capital Region/
Ressources naturelles Canada, Service canadien des forêts, Région de la capitale nationale

Louis Morneau
Ministère des Ressources naturelles et de la Faune du Québec

Vince Nealis
Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre/
Ressources naturelles Canada, Service canadien des forêts, Centre de foresterie du Pacifique

Gina Penny
Nova Scotia Department of Natural Resources

Stan Phippen
Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre/
Ressources naturelles Canada, Service canadien des forêts, Centre de foresterie des Grand Lacs

Irene Pines
Manitoba Conservation, Forestry Branch

Sunil Ranasinghe
Alberta Sustainable Resource Development, Forestry Division

Taylor Scarr
Ontario Ministry of Natural Resources/
Ministère des Richesses naturelles de l'Ontario

Jan Volney
Natural Resources Canada, Canadian Forest Service, Northern Forestry Centre/
Ressources naturelles Canada, Service canadien des forêts, Centre de foresterie du Nord

PLANNING TEAM / L'ÉQUIPE DE PLANIFICATION

Stan Phippen, *Planning Team Leader*
Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre/
Ressources naturelles Canada, Service canadien des forêts, Centre de foresterie des Grand Lacs

Benoit Arsenault
Natural Resources Canada, Canadian Forest Service, Laurentian Forestry Centre/
Ressources naturelles Canada, Service canadien des forêts, Centre de foresterie des Laurentides

Lise Caron
Natural Resources Canada, Canadian Forest Service, Laurentian Forestry Centre/
Ressources naturelles Canada, Service canadien des forêts, Centre de foresterie des Laurentides

Anthony Hopkin
Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre/
Ressources naturelles Canada, Service canadien des forêts, Centre de foresterie des Grand Lacs

Mary Humphries
Eastern Ontario Model Forest/
Forêt modèle de l'Est de l'Ontario

Karen Jamieson
Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre/
Ressources naturelles Canada, Service canadien des forêts, Centre de foresterie des Grand Lacs

Sandy Knight
Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre/
Ressources naturelles Canada, Service canadien des forêts, Centre de foresterie des Grand Lacs

Lucie Labrecque
Natural Resources Canada, Canadian Forest Service, Laurentian Forestry Centre/
Ressources naturelles Canada, Service canadien des forêts, Centre de foresterie des Laurentides

Elaine MacDonald
Natural Resources Canada, Shared Services Office, Central Region/
Ressources naturelles Canada, Bureau des services partagés, Région centrale

Mark Primavera
Natural Resources Canada, Communications and Marketing Branch, Ontario Region/
Ressources naturelles Canada, Direction des communications et du marketing, Région de l'Ontario

IN MEMORIAM

The Forest Pest Management Forum would like to acknowledge

Peter de Groot

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Le Forum sur la répression des ravageurs forestiers aimerait souligner la contribution de

Peter de Groot

de Ressources naturelles Canada, Service canadien des forêts, au succès du Forum et à l'avancement de la recherche sur la lutte contre les ravageurs forestiers au Canada.

FOREST PEST MANAGEMENT FORUM 2010 PROCEEDINGS / COMPTE RENDU DU FORUM 2010 SUR LA REPRESSION DES RAVAGEURS FORESTIERS

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NOVEMBER 30 – DECEMBER 2, 2010 / 30 NOVEMBRE – 2 DECEMBRE 2010

The Forest Pest Management Forum is sponsored annually by Natural Resources Canada, Canadian Forest Service, to provide a platform for representatives of various provincial governments and the federal government to present, review and discuss current forest pest conditions in Canada and the United States.

Le Forum sur la répression des ravageurs est parrainé annuellement par le Service canadien des forêts de Ressources naturelles Canada. Il permet à des représentants de divers gouvernements provinciaux et du gouvernement fédéral de présenter et d'examiner la situation des principaux ravageurs forestiers au Canada et aux États-Unis.

Anthony Hopkin
Chair, Steering Committee
Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre
1219 Queen Street East, Sault Ste. Marie, ON P6A 2E5
ahopkin@nrcan.gc.ca
(705) 541-5568

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THE 2010 FORUM ORGANIZING COMMITTEE

Le Forum 2010 sur la répression des ravageurs forestiers a connu encore un grand succès grâce à la contribution de plusieurs personnes. Nous remercions tout d'abord nos conférenciers qui ont fait état de leurs connaissances sur les questions discutées et qui ont bien voulu les résumer pour les besoins du présent recueil. Nous aimerions aussi témoigner notre reconnaissance aux personnes qui ont participé à la Science et technologie à la carte et à l'Événement spécial du Forum 2010 et au soutien technique. Nos remerciements vont également aux participants qui provenaient de différentes régions du Canada et des États-Unis.

LE COMITÉ ORGANISATEUR DU FORUM 2010

Participants

FORUM 2010

Wanda Alexander
Canadian Food Inspection Agency
59 Camelot Drive
Ottawa ON
K1A 0Y9
Tel.: 613-773-7266
wanda.alexander@inspection.gc.ca

Abdul Ameen
Canadian Food Inspection Agency
1400 Merivale Road
Ottawa ON
K1A 0Y9
Tel.: 613-773-5256
abdullahi.ameen@inspection.gc.ca

Peter Amirault
Forest Protection Limited
2502 Route 102 Hwy
Lincoln NB
E3B 7E6
Tel.: 506-446-6930
pamirault@forestprotectionlimited.com

Eric Arsenault
NRCan, CFS
Northern Forestry Centre
5320–122nd Street Northwest
Edmonton AB
T6H 3S5
Tel.: 780-435-7204
eric.arsenault@nrcan.gc.ca

Jacques Audette
Canadian Food Inspection Agency
3100 Laframboise Boulevard
St-Hyacinthe QC
J2S 4Z4
Tel.: 450-773-6639 x126
jacques.audette@inspection.gc.ca

Bob Baker
Bob Baker Forestry Services
RR #5
Georgetown ON
L7G 4S8
Tel.: 905-877-9390
bakerforestryservices@hughes.net

Allison Barr
Canadian Food Inspection Agency
350 Ontario Street, Unit 13
P.O. Box 9
St. Catharines ON
L2R 5L8
Tel.: 905-937-3196
allison.barr@inspection.gc.ca

Debby Barsi
NRCan, CFS
2934 Baseline Road
Ottawa ON
K1A 0E4
Tel.: 613-990-5884
debby.barsi@nrcan.gc.ca

Annie Baxter
Canadian Food Inspection Agency
59 Camelot Drive
Ottawa ON
K1A 0Y9
Tel.: 613-773-7275
annie.baxter@inspection.gc.ca

Judi Beck
NRCan, CFS
Pacific Forestry Centre
506 West Burnside Road
V8Z 1M5
Tel.: 250-363-0705
judi.beck@nrcan.gc.ca

Robert Bellemare
Ministère des Ressources naturelles et de la Faune du Québec
2700, rue Einstein, bureau D.2.370a
Québec QC
G1P 3W8
Tel. : 418-643-9679 x4700
robert.bellemare@mrnf.gouv.qc.ca

Cedric Bertrand
Tree Canada
105 Fontaine Street
Gatineau QC
J8Y 2C2
Tel.: 613-567-5545 x225
cbertrand@treecanada.ca

Jean Bérubé
RNCan, SCF
Centre de foresterie des Laurentides
1055, rue du P.E.P.S.
C.P. 10380, succ. Sainte-Foy
Québec QC
G1V 4C7
Tel. : 418-648-7174
jean.berube@rncan.gc.ca

Yannick Bidon
AEF Global Inc.
201, Mgr-Bourget
Lévis QC
G6V 9V6
Tel. : 418-838-4441
ybidon@aefglobal.com

Sophia Boivin
Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec
200, chemin Sainte-Foy, 10e étage
Québec QC
G1R 4X6
Tel. : 418-380-2100 x3861
sophia.boivin@map.aq.gouv.qc.ca

Participants

FORUM 2010

Paul Bolan
BioForest Technologies Inc.
105 Bruce Street
Sault Ste. Marie ON
P6A 2X6
Tel.: 705-942-5824
pbolan@bioforest.ca

Anne-Christine Bonfils
National Research Council Canada
100 Sussex Drive
Ottawa ON
K1A 0R6
Tel.: 613-993-8901
anne-christine.bonfils@nrc-cnrc.gc.ca

Martin Bonneau
Ministère des Ressources naturelles
et de la Faune du Québec
2700, rue Einstein
bureau D.2.370a
Québec QC
G1P 3W8
Tel. : 418-643-9679 x4712
martin.bonneau.gouv.qc.ca

Stephen Brière
Canadian Food Inspection Agency
3851 Fallowfield Road
P.O. Box 11300
Nepean ON
K2H 8P9
Tel.: 613-228-6690 x5911
stephen.m.briere@inspection.gc.ca

Josee Brizard
South Nation Conservation
38 Victoria Street
P.O. Box 29
Finch ON
K0C 1K0
Tel.: 613-984-2948
jbrizard@nation.on.ca

James Brown
National Capital Commission
202-40 Elgin Street
Ottawa ON
K1P 1C7
Tel.: 613-239-5555
james.brown@ncc-ccn.ca

Victor Brunette
Agence des forêts privées de l'Outaouais
Place Gascon, Suite 200
363, montée de la Source
Cantley QC
J8V 0G6
Tel. : 819-827-0338
vb.afpo@qc.aira.com

Ian Buchanan
York Region -
Natural Heritage and Forestry
17250 Yonge Street, Box 147
Newmarket ON
L3Y 6Z1
Tel.: 905-895-1200 x5204
ian.buchanan@york.ca

Erin Bullas-Appleton
Canadian Food Inspection Agency
174 Stone Road West
Guelph ON
N1G 4S9
Tel.: 519-826-2828
erin.bullas-appleton@inspection.gc.ca

Mark Burkholder
Toronto and Region
Conservation Authority
5 Shoreham Drive
Downsview ON
M3N 1S4
Tel.: 416-661-6600 x5597

Lise Caron
RNCan, SCF
Centre de foresterie des Laurentides
1055, rue du P.E.P.S.
C.P. 10380, succ. Sainte-Foy
Québec QC
G1V 4C7
Tel. : 418-648-7616
lise.caron@rncan.gc.ca

Nelson Carter
NB Department of Natural Resources
1350 Regent Street
P.O. Box 6000
Fredericton NB
E3B 5H1
Tel.: 506-453-6641
nelson.carter@gnb.ca

Terry Caunter
Health Canada
Pest Management Regulatory Agency
2720 Riverside Drive
Ottawa ON
K1A 0K9
Tel.: 613-736-3779
terry.caunter@hc-sc.gc.ca

Paul Chaloux
USDA, APHIS
4700 River Road, Unit 137
Riverdale MD
20737
Tel.: 301-734-0917
paul.chaloux@aphis.usda.gov

Rose-Marie Chrétien
South Nation Conservation
38 Victoria Street
P.O. Box 29
Finch ON
K0C 1K0
Tel.: 897-984-2948
rchretien@nation.on.ca

Participants

FORUM 2010

Eric Cleland
Ontario Ministry of Natural Resources
615 John Street North
Aylmer ON
N5H 2S8
Tel.: 519-773-4741
eric.cleland@ontario.ca

Barry Cooke
NRCan, CFS
Northern Forestry Centre
5320–122nd Street
Edmonton AB
T6H 3S5
Tel.: 780-430-3844
barry.cooke@nrcan.gc.ca

Joffre Cote
Ontario Ministry of Natural Resources
10 Campus Drive
P.O. Bag 2002
Kemptville ON
K0G 1J0
Tel.: 613-692-0014 x119
joffre.cote@ontario.ca

Mike Cruickshank
NRCan, CFS, CWFC
Pacific Forestry Centre
506 West Burnside Road
Victoria BC
V8Z 1M5
Tel.: 250-363-0641
mike.cruickshank@nrcan.gc.ca

Michael Cunningham
Engage Agro Corporation
P.O. Box 3142, Station B
Fredericton NB
E3A 5G9
Tel.: 506-451-9712
michaelcunningham@engageagro.com

Edward Czerwinski
Forestree Care Company
171 Berkley Drive
New Maryland NB
E3C 1C2
Tel.: 613-808-8755
forestreecare@nexicom.net

Anna Dabros
NRCan, CFS
2934 Baseline Road
Ottawa ON
K1A 0E4
Tel.: 613-990-6383
anna.dabros@nrcan.gc.ca

Phyllis Dale
NRCan, CFS
2934 Baseline Road
Ottawa ON
K1A 0E4
Tel.: 613-990-5730
phyllis.dale@nrcan.gc.ca

Richard David
Mohawk Council of Akwesasne
P.O. Box 579
Cornwall ON
K6H 5T3
Tel.: 613-936-1548
rdavid@akwesasne.ca

David Davies
Forest Protection Limited
Fredericton Airport
2502 Route 102 Hwy
Lincoln NB
E3B 7E6
Tel.: 506-446-6930
ddavies@forestprotectionltd.com

Chuck Davis
NRCan, CFS
Great Lakes Forestry Centre
1219 Queen Street East
Sault Ste. Marie ON
P6A 2E5
Tel.: 705-541-5724
chuck.davis@nrcan.gc.ca

Marcel Dawson
Canadian Food Inspection Agency
59 Camelot Drive
Ottawa ON
K1A 0Y9
Tel.: 613-773-7265
marcel.dawson@inspection.gc.ca

John Dedes
NRCan, CFS
Great Lakes Forestry Centre
1219 Queen Street East
Sault Ste. Marie ON
P6A 2E5
Tel.: 705-541-5673
john.dedes@nrcan.gc.ca

Ian DeMerchant
NRCan, CFS
Atlantic Forestry Centre
1350 Regent Street
P.O. Box 4000
Fredericton NB
E3B 5P7
Tel.: 506-452-3137
ian.demerchant@nrcan.gc.ca

Alice Deschamps
NRCan, ESS
588 Booth Street
Ottawa ON
K1A 0Y9
Tel.: 613-947-1279
alice.deschamps@nrcan.gc.ca

Participants

FORUM 2010

Erhard Dobesberger
Canadian Food Inspection Agency
1400 Merivale Road
Ottawa ON
K1A 0Y9
Tel.: 613-773-5282
erhard.dobesberger@inspection.gc.ca

Brad Doiron
Canadian Food Inspection Agency
59 Camelot Drive
Ottawa ON
K1A 0Y9
Tel.: 613-773-7269
brad.doiron@inspection.gc.ca

Steve Dominy
NRCan, CFS
Great Lakes Forestry Centre
1219 Queen Street East
Sault Ste. Marie ON
P6A 2E5
Tel.: 705-541-5590
steve.dominy@nrcan.gc.ca

Amanda Dooney
Norfolk County
Community Service Department
95 Culver Street
Simcoe ON
N3Y 2V5
Tel.: 519-426-5999 x2245
amanda.dooney@norfolkcounty.ca

Hume Douglas
Canadian Food Inspection Agency
960 Carling Avenue
Ottawa ON
K1A 0C6
Tel.: 613-759-7128
hume.douglas@inspection.gc.ca

Cameron Duff
Canadian Food Inspection Agency
1400 Merivale Road
Ottawa ON
K1A 0Y9
Tel.: 613-733-5232
cameron.duff@inspection.gc.ca

Jacques Dugal
Valent BioSciences Canada Ltd.
56, rue de la Perdrix
Stoneham QC
G0A 4P0
Tel. : 418-848-0823
jacques.dugal@valent.com

Louise Dumouchel
Canadian Food Inspection Agency
1400 Merivale Road
Ottawa ON
K1A 0Y9
Tel.: 613-773-5254
louise.dumouchel@inspection.gc.ca

Peter Ebling
NRCan, CFS
Great Lakes Forestry Centre
1219 Queen Street East
Sault Ste Marie ON
P6A 2E5
Tel.: 705-541-5517
peter.ebling@nrcan.gc.ca

Suzanne Ellwood
NRCan, CFS
2934 Baseline Road
Ottawa ON
K1A 0E4
Tel.: 613-991-4463
suzanne.ellwood@nrcan.gc.ca

James Elwin
Health Canada
Pest Management Regulatory Agency
2720 Riverside Drive
Ottawa ON
K1A 0K9
Tel.: 613-736-3873
james.elwin@hc-sc.gc.ca

Nadir Erbilgin
University of Alberta
230A Earth Sciences
Edmonton AB
T6G 2E3
Tel.: 780-492-8693
nadir.erbilgin@ales.ualberta.ca

James Evans
Newfoundland Department of Natural Resources
P.O. Box 2006
Fortis Building
Corner Brook NL
A2H 6J8
Tel.: 709-637-2424
jimevans@gov.nl.ca

Robert Favrin
Canadian Food Inspection Agency
1400 Merivale Road
Ottawa ON
K1A 0Y9
Tel.: 613-773-5266
robert.favrin@inspection.gc.ca

Liz Foster
Canadian Food Inspection Agency
1400 Merivale Road
Ottawa ON
K1A 0Y9
Tel.: 613-773-5301
liz.foster@inspection.gc.ca

Participants

Cédric Fournier
Ministère des Ressources naturelles et de la Faune du Québec
2700, rue Einstein, bureau D.2.370a
Québec QC
G1P 3W8
Tel.: 418-643-9679 x4721
cedric.fournier@mrnf.gouv.qc.ca

Mario Fournier
National Capital Commission
40 Elgin Street
Suite 202
Ottawa ON
K1P 1C7
Tel.: 613-239-5226
mario.fournier@ncc-ccn.gc.ca

Mike Francis
Ontario Ministry of Natural Resources
1235 Queen Street East
Sault Ste. Marie ON
P6A 2E5
Tel.: 705-945-6763
mike.francis@ontario.ca

Bill Gaines
Conservation Halton
2596 Britannia Road West
Burlington ON
L7P 0G3
Tel.: 905-336-1158 x261
bgaines@hrca.on.ca

Jacques Gagnon
NRCan, CFS
2934 Baseline Road
Ottawa ON
K1A 0E4
Tel.: 613-990-5827
jacques.gagnon@nrcan.gc.ca

Guy Genest
Primewood Lumber
1150 Labonté
Drummondville QC
J2C 5Y4
Tel.: 819-478-7721
ggenest@primewood-lumber.com

Nicolas Girard
SOPFIM
1780, rue Semple
Québec QC
G1N 4B8
Tel. : 418-681-6681
n.girard@sopfim.qc.ca

Mike Goodyear
Toronto and Region
Conservation Authority
5 Shoreham Drive
Downsview ON
M3N 1S4
Tel.: 416-661-6600 x5578
mgoodyear@trca.on.ca

Mike Gravel
Government of the Northwest Territories
Environment & Natural Resources
P.O. Box 4354
#173 Hay River Dene Reserve
Hay River NT
X0E 1G3
Tel.: 867-874-2009
mike.gravel@gov.nt.ca

Jeremy Gullison
NB Department of Natural Resources
P.O. Box 6000
Fredericton NB
E3B 5H1
Tel.: 506-453-3356
jeremy.gullison@gnb.ca

Mike Halferty
Canadian Institute of Forestry
c/o The Canadian Ecology Centre
6905 Hwy 17 West
P.O. Box 430
Mattawa ON
P0H 1V0
Tel.: 705-744-1715 x609
halferty@canadianecology.ca

Ronald Hall
NRCan CFS
Northern Forestry Centre
5320–122nd Street
Edmonton AB
T6H 3S5
Tel.: 780-435-7209
ron.hall@nrcan.gc.ca

Richard Hamelin
RNCan, SCF
Centre de foresterie des Laurentides
1055, rue du P.E.P.S.
C.P. 10380, succ. Sainte-Foy
Québec QC
G1V 4C7
Tel. : 418-648-3693
richard.hamelin@rncan.gc.ca

Brian Hamilton
Canadian Food Inspection Agency
1200 Commissioners Road East
Unit 19
London ON
N5Z 4R3
Tel.: 519-691-1306 x175
brian.hamilton@inspection.gc.ca

Louis Harvey
Ministère des Ressources naturelles et de la Faune du Québec
163, chemin de la Chure
Mansfield QC
J0X 1R0
Tel. : 819-683-2626 x254
louis.harvey@mrnf.gouv.qc.ca

Participants

FORUM 2010

Janice Hodge
JCH Forest Pest Management
7700 DeJong Drive
Coldstream BC
V1B 1P3
Tel.: 250-275-7341
jchforhealth@shaw.ca

Anthony Hopkin
NRCan, CFS
Great Lakes Forestry Centre
1219 Queen Street East
Sault Ste. Marie ON
P6A 2E5
Tel.: 705-541-5568
anthony.hopkin@nrcan.gc.ca

Jean-Francois Houle
Parcs Québec
1001, chemin des Presqu'îles
Plaisance QC
J0V 1S0
Tel. : 819-427-5350 x224
houle.jeanfrancois@sepaq.com

Mary Humphries
Eastern Ontario Model Forest
P.O. Bag 2111
Kemptville ON
K0G 1J0
Tel.: 613-258-8241
mhumphries@eomf.on.ca

Edward Hurley
NRCan, CFS
Atlantic Forestry Centre
1350 Regent Street
P.O. Box 4000
Fredericton NB
E3B 5P7
Tel.: 506-452-3515
edward.hurley@nrcan.gc.ca

Michael Irvine
Ontario Ministry of Natural Resources
70 Foster Drive
Suite 400
Sault Ste. Marie ON
P6A 6V5
Tel.: 705-945-5724
michael.irvine@ontario.ca

Richard Ivan
Canadian Food Inspection Agency
1400 Merivale Road
Ottawa ON
K1A 0K9
Tel.: 613-773-5444
richard.ivan@inspection.gc.ca

Jan Jetten
Ville de Gatineau
100, rue d'Edmonton
Gatineau QC
J8Y 6N2
Tel. : 819-243-2345 x7559
jetten.jan@gatineau.ca

Christopher Keeling
University of British Columbia
Michael Smith Laboratories
301-2185 East Mall
Vancouver BC
V6T 1Z4
Tel.: 604-827-5314
ckeeling@interchange.ubc.ca

Troy Kimoto
Canadian Food Inspection Agency
4321 Still Creek Drive
Burnaby BC
V5C 6S7
Tel.: 604-666-7503
troy.kimoto@inspection.gc.ca

Michelle Kivi
Health Canada
Pest Management Regulatory Agency
2720 Riverside Drive
Ottawa ON
K1A 0K9
Tel.: 613-736-3501
michelle.kivi@hc-sc.gc.ca

Sandy Knight
NRCan, CFS
Great Lakes Forestry Centre
1219 Queen Street East
Sault Ste Marie ON
P6A 2E5
Tel.: 705-541-5638
sandy.knight@nrcan.gc.ca

Wade Knight
Ontario Woodlot Association
275 County Road #4
RR #4
Kemptville ON
K0G 1J0
Tel.: 613-258-0110 x223
info@ont-woodlot-assoc.org

Dave Kreutzweiser
NRCan, CFS
Great Lakes Forestry Centre
1219 Queen Street East
Sault Ste. Marie ON
P6A 2E5
Tel.: 705-541-5648
dave.kreutzweiser@nrcan.gc.ca

Lucie Labrecque
RNCan, SCF
Centre de foresterie des Laurentides
1055, rue du P.E.P.S.
C.P. 10380, succ. Sainte-Foy
Québec QC
G1V 4C7
Tel.: 418-648-3927
lucie.labrecque@rncan.gc.ca

Participants

Gaston Laflamme
RNCan, SCF
Centre de foresterie des Laurentides
1055, rue du P.E.P.S.
C.P. 10380, succ. Sainte-Foy
Québec QC
G1V 4C7
Tel.: 418-648-4149
gaston.laflamme@rncan.gc.ca

Renée Lapointe
Sylvar Technologies Inc.
P.O. Box 636, Stn. "A"
Fredericton NB
E3B 5A6
Tel.: 506-444-5690
rlapointe@sylvar.ca

Fernand Larocque
Albert Larocque Lumber Ltd.
994 Green Lane Road
Hwy 34 South
Hawkesbury ON
K6A 2R8
Tel.: 613-632-8521
larocquelumber@on.aibn.com

Robert Lavallée
RNCan, SCF
Centre de foresterie des Laurentides
1055, rue du P.E.P.S.
C.P. 10380, succ. Sainte-Foy
Québec QC
G1V 4C7
Tel.: 418-648-5803
robert.lavallee@rncan.gc.ca

Antoine Leboeuf
Ministère des Ressources naturelles et de la Faune du Québec
3371, rue Blard
Québec QC
G1X 2B2
Tel. : 418-627-8669 x4306
antoine.leboeuf@mrnf.gouv.qc.ca

Shiyou Li
Agriculture and Agri-Food Canada
960 Carling Avenue
Building 57
Ottawa ON
K1A 0C6
Tel.: 613-694-2459
shiyou.li@agr.gc.ca

Cory Lindgren
Canadian Food Inspection Agency
269 Main Street
Winnipeg MB
R3C 1B2
Tel.: 204-983-2212
cory.lindgren@inspection.gc.ca

Christopher Lucarotti
NRCan, CFS
Atlantic Forestry Centre
1350 Regent Street
P.O. Box 4000
Fredericton NB
E3B 5P7
Tel.: 506-452-3538
christopher.lucarotti@nrcan.gc.ca

Daniel Lux
Alberta Sustainable Resources
Sustainable Resource Development
Great West Life Building
9920–108th Street
Edmonton AB
T5K 2M4
Tel.: 780-644-2246
daniel.lux@gov.ab.ca

Mary Beth Lynch
Parks Canada
2 County Road 5
RR #3
Mallorytown ON
K0E 1R0
Tel.: 613-923-5685
marybeth.lynch@pc.gc.ca

Barry Lyons
NRCan, CFS
Great Lakes Forestry Centre
1219 Queen Street East
Sault Ste. Marie ON
P6A 2E5
Tel.: 705-541-5617
barry.lyons@nrcan.gc.ca

Tim MacDonald
Health Canada
Pest Management Regulatory Agency
2720 Riverside Drive
Ottawa ON
K1A 0K9
Tel.: 613-736-3690
tim.macdonald@hc-sc.gc.ca

Wayne MacKinnon
NRCan, CFS
Atlantic Forestry Centre
1350 Regent Street
P.O. Box 4000
Fredericton NB
E3B 5P7
Tel.: 506-451-6096
wayne.mackinnon@nrcan.gc.ca

Bonnie MacLeod
Health Canada
Pest Management Regulatory Agency
2720 Riverside Drive
Ottawa ON
K1A 0K9
Tel.: 613-736-3892
bonnie.macleod@hc-sc.gc.ca

Chris MacQuarrie
NRCan, CFS
Great Lakes Forestry Centre
1219 Queen Street East
Sault Ste. Marie ON
P6A 2E5
Tel.: 705-541-5666
chris.macquarrie@nrcan.gc.ca

Participants

Kathy Makela
Agriculture and Agri-Food Canada
Pesticide Reduction Program
960 Carling Avenue
Building 57, CEF
Ottawa ON
K1A 0C6
Tel.: 613-759-7393
kathryn.makela@agr.gc.ca

Gary Man
USDA Forest Service
1400 Independence Avenue SW
Washington D.C.
20250-0003
Tel.: 703-605-5339
gman@fs.fed.us

Richard Marcantonio
Canadian Food Inspection Agency
59 Camelot Drive
Ottawa ON
K1A 0Y9
Tel.: 613-773-7273
richard.marcantonio@inspection.gc.ca

Mireille Marcotte
Canadian Food Inspection Agency
59 Camelot Drive
Ottawa ON
K1A 0Y9
Tel.: 613-773-7270
mireille.marcotte@inspection.gc.ca

Jean-Pierre Martel
Bio-Horticentre
235, chemin Eardley
Gatineau QC
J9J 2Y8
Tel. : 613-258-8424
info@biohorticentre.ca

Jim McCready
10 Campus Drive
P.O. Bag 2111
Kemptville, ON
K0G 1J0
Tel.: 613-258-8424
jmcready@cyberus.ca

Rory McIntosh
Saskatchewan Ministry of Environment
P.O. Box 3003, McIntosh Mall
201–1061 Central Avenue
Prince Albert SK
S6V 6G1
Tel.: 306-953-3617
rory.mcintosh@gov.sk.ca

Nicole McKenzie
Health Canada
Pest Management Regulatory Agency
2720 Riverside Drive
Ottawa ON
K1A 0K9
Tel.: 613-736-3393
nicole.mckenzie@hc-sc.gc.ca

Scott McPherson
Ontario Ministry of Natural Resources
3301 Trout Lake Road
North Bay ON
P1A 4L7
Tel.: 705-475-5571
scott.mcpherson@ontario.ca

Geoff McVey
United Counties of
Leeds and Grenville
25 Central Avenue
Brockville ON
K6V 4N6
Tel. : 613-342-3840 x2416
geoff.mcvey@uclg.on.ca

Matt Meade
The Canadian Institute of Forestry
17–780 Waterloo Street
Port Elgin ON
N0H 2C2
Tel.: 705-744-1715 x595
mmeade@cif-ifc.org

Joe Meating
BioForest Technologies Inc.
105 Bruce Street
Sault Ste. Marie ON
P6A 2X6
Tel.: 705-942-5824
jmeating@bioforest.ca

Melanie Mecteau
Canadian Food Inspection Agency
59 Camelot Drive
Ottawa ON
K1A 0Y9
Tel.: 613-221-4352
melanie.mecteau@inspection.gc.ca

Bob Mickle
SERG International
12 Welsh Drive
RR #3
Ayr ON
N0B 1E0
Tel.: (519) 632-7953
Bob.Mickle@REMSpC.com

Steve Miller
Canadian Food Inspection Agency
1400 Merivale Road
Ottawa ON
K1A 0Y9
Tel.: (613) 773-5268
steve.miller@inspection.gc.ca

Participants

FORUM 2010

Ben Moody
NRCan, CFS
2934 Baseline Road
Ottawa ON
K1A 0E4
Tel.: (613) 991-4337
ben.moody@nrcan.gc.ca

Dean Morewood
Health Canada
Pest Management Regulatory Agency
2720 Riverside Drive
Ottawa ON
K1A 0K9
Tel.: (613) 736-3931
dean.morewood@hc-sc.gc.ca

Louis Morneau
Ministère des Ressources naturelles et de la Faune du Québec
2700, rue Einstein, local D.2.370A
Québec QC
G1P 3W8
Tel. : 418-643-9679 x4742
louis.morneau@mrnf.gouv.qc.ca

Nicolas Nadeau-Thibodeau
RNCan, SCF
Centre de foresterie des Laurentides
1055, rue du P.E.P.S.
C.P. 10380, succ. Sainte-Foy
Québec QC
G1V 4C7
nicolas.nadeau-thibodeau@nrcan.gc.ca

Stephen Nicholson
Valent BioSciences Canada Ltd.
c/o 2704 Orser Road
Elginburg ON
K0H 1M0
Tel.: 613-376-1070
stephen.nicholson@valent.com

Mary Orr
Canadian Food Inspection Agency
1124 Finch Avenue West
Toronto ON
M3J 2E2
Tel.: 416-661-8158
mary.orr@inspection.gc.ca

Malcolm Pelley
Canadian Food Inspection Agency
1992 Agency Drive
Dartmouth NS
B3B 1Y9
Tel.: 902-426-2922
malcolm.pelley@inspection.gc.ca

Bruce Pendrel
NRCan, CFS
Atlantic Forestry Centre
P.O. Box 4000
Fredericton NB
E3B 5P7
Tel.: 506-452-3505
bruce.pendrel@nrcan.gc.ca

Gina Penny
Nova Scotia Department of Natural Resources
P.O. Box 130
Shubenacadie
Hants County NS
B0N 2H0
Tel.: 902-758-7212
pennygm@gov.ns.ca

Luc Philion
Ville de Gatineau
476, rue St-René Est
Gatineau QC
J8P 8A9
Tel. : 819-243-2345 x4554
philion.luc@gatineau.ca

Stan Phippen
NRCan, CFS
Great Lakes Forestry Centre
1219 Queen Street East
Sault Ste. Marie ON
P6A 2E5
Tel.: 705-541-5565
stan.phippen@nrcan.gc.ca

Irene Pines
Manitoba Conservation
Forestry Branch
200 Saulteaux Crescent
P.O. Box 70
Winnipeg MB
R3J 3W3
Tel.: 204-945-7985
irene.pines@gov.mb.ca

Annemarie Piscopo
Ontario Ministry of Natural Resources
70 Foster Drive
Suite 400
Sault Ste. Marie ON
P6A 6V5
Tel.: 705-945-6573
annemarie.piscopo@ontario.ca

Jean Poirier
Ministère des Ressources naturelles et de la Faune du Québec
200, rue Belvédère Nord, bureau 1.05
Sherbrooke QC
J1H 4A9
Tel. : 819-820-3176 x234
jean.poirier@mrnf.gouv.qc.ca

Jason Pollard
City of Ottawa
100 Constellation Crescent
Ottawa ON
K2G 6J8
Tel.: 613-580-2424 x16012

Participants

Kevin Porter
NRCan, CFS
Atlantic Forestry Centre
1350 Regent Street
P.O. Box 4000
Fredericton NB
E3B 5P7
Tel.: 506-452-3838
kevin.porter@nrcan.gc.ca

Shannon Porter
Porter Lumber Ltd.
#1441 Region Road 3
Port Dover ON
N0A 1N1
Tel.: 519-583-1678

Marcia Quaquarelli
AEF Global
201, Mgr-Bourget
Lévis QC
G6V 9V6
Tel. : 418-838-4441 x103
mquaquarelli@aefglobal.com

Martin Racine
Ville de Gatineau
100, rue d'Edmonton
Gatineau QC
J8Y 6N2
Tel. : 819-243-2345 x7565
racine.martin@gatineau.ca

Kami Ramcharan
NRCan, CFS
Pacific Forestry Centre
506 West Burnside Road
Victoria BC
V8Z 1M5
Tel.: 250-363-0608
kami.ramcharan@nrcan.gc.ca

Tannah Rampersad
Canadian Food Inspection Agency
1124 Finch Avenue West
Unit 2
Toronto ON
M3J 2E2
Tel.: 416-661-8646
tannah.rampersad@inspection.ca

Tod Ramsfield
NRCan, CFS
Northern Forestry Centre
5320–122nd Street
Edmonton AB
T6H 3S5
Tel.: 780-435-7394
tod.ramsfield@nrcan.gc.ca

Marc Rhainds
NRCan, CFS
Atlantic Forestry Centre
1350 Regent Street
P.O. Box 4000
Fredericton NB
E3B 5P7
Tel.: 506-452-3500
marc.rhainds@nrcan.gc.ca

Stefan Richard
Sylvar Technologies Inc.
P.O. Box 636, Stn. "A"
Fredericton NB
E3B 5A6
Tel.: (506) 444-5690
srichard@sylvar.ca

Christopher Riley
Fredericton NB
Tel.: 506-452-1228
chris.riley@rpc.ca

Danny Rioux
RNCan, SCF
Centre de foresterie des Laurentides
1055, rue du P.E.P.S.
C.P. 10380, succ. Sainte-Foy
Québec QC
G1V 4C7
Tel. : 418-648-3127
danny.rioux@rncan.gc.ca

Tony Ritchie
Canadian Food Inspection Agency
59 Camelot Drive
Ottawa ON
K1A 0Y9
Tel.: 613-773-7255
tony.ritchie@inspection.gc.ca

Youness Rizki
NRCan, CFS
2934 Baseline Road
Ottawa ON
K1A 0E4
Tel.: 613-998-7087
youness.rizki@nrcan.gc.ca

Dan Rowlinson
Ontario Ministry of Natural Resources
1235 Queen Street East
Sault Ste. Marie ON
P6A 2E5
Tel.: 705-946-7445
dan.rowlinson@ontario.ca

Vincent Roy
RNCan, SCF
Centre de foresterie des Laurentides
1055, rue du P.E.P.S.
C.P. 10380, succ. Sainte-Foy
Québec QC
G1V 4C7
Tel. : 418-648-3770
vincent.roy@nrcan.gc.ca

Participants

Julia Ruhl
Canadian Food Inspection Agency
160 Artisan Industrial Parkway
Bradford ON
L3Z 3G3
Tel.: 905-775-5522 x233
julia.ruhl@inspection.gc.ca

Krista Ryall
NRCan, CFS
Great Lakes Forestry Centre
1219 Queen Street East
Sault Ste. Marie ON
P6A 2E5
Tel.: 705-541-5549
krista.ryall@nrcan.gc.ca

Jean-Luc St-Germain
NRCan, CFS
2934 Baseline Road
Ottawa ON
K1A 0E4
Tel.: 613-990-5696
jean-luc.st-germain@nrcan.gc.ca

Marie-Pierre Samson
Ministère des Ressources naturelles et de la Faune du Québec
133, rue Tardif
Québec QC
G1B 3L1
Tel. : 418-627-8669 x4442
marie-pierre.samson@mrnf.gouv.qc.ca

Normand Sans-Cartier
Camionnage
Normand Sans-Cartier
27, rue de Granby
Gatineau QC
J8R 3X5
Tel. : 819-669-9685
normandsanscartier@bellnet.ca

Taylor Scarr
Ontario Ministry of Natural Resources
70 Foster Drive
Suite 400
Sault Ste. Marie ON
P6A 6V5
Tel.: 705-945-5723
taylor.scarr@ontario.ca

Simon Shamoun
NRCan, CFS
Pacific Forestry Centre
506 West Burnside Road
Victoria BC
V8Z 1M5
Tel.: 250-363-0766
simon.shamoun@nrcan.gc.ca

Brent Shantz
Canadian Food Inspection Agency
38 Auriga Drive
Nepean ON
K2E 8A5
Tel.: 613-946-7891
brent.shantz@inspection.gc.ca

Loretta Shields
Canadian Food Inspection Agency
395 Ontario Street
St. Catharines ON
L2N 7N6
Tel.: 905-937-8285
loretta.shields@inspection.gc.ca

Ralph Sikkema
Manotick Tree Movers Inc.
1966 Carsonby Road West
North Gower ON
K0A 2T0
Tel.: 613-489-1116
info@manotticktree.com

Ralph Simpson
NRCan, CFS
Atlantic Forestry Centre
1350 Regent Street
P.O. Box 4000
Fredericton NB
E3B 5P7
Tel.: 506-452-2446
ralph.simpson@nrcan.gc.ca

Rob Skakun
NRCan, CFS
Northern Forestry Centre
5320-122nd Street Northwest
Edmonton AB
T6H 3S5
Tel.: 780-435-7384
rob.skakun@nrcan.gc.ca

Rod Smith
NRCan, CFS
Great Lakes Forestry Centre
1219 Queen Street East
Sault Ste. Marie ON
P6A 2E5
Tel.: 705-541-5561
rod.smith@nrcan.gc.ca

Ian Smyth
Ontario Ministry of Natural Resources
300 Water Street
P.O. Box 7000
Peterborough ON
K9J 8M5
Tel.: 705-755-5974
ian.smyth@ontario.ca

Krysta Soulière
The Canadian Institute of Forestry
c/o The Canadian Ecology Centre
6905 Hwy 17 West
P.O. Box 430
Mattawa ON
P0H 1V0
Tel.: 705-744-1715
ksouliere@cif-ifc.org

Participants

Felix Sperling
University of Alberta
ES 2088, Biological Sciences
11455 Saskatchewan Drive
T6G 2E3
Edmonton AB
Tel.: 780-492-3991
felix.sperling@ualberta.ca

Fred Stevens
Manotick Tree Movers Inc.
1966 Carsonby Road West
North Gower ON
K0A 2T0
Tel.: 613-489-1116
info@manotticktree.com

Rona Sturrock
NRCan, CFS
Pacific Forestry Centre
506 West Burnside Road
Victoria BC
V8Z 1M5
Tel.: 250-363-0789
rona.sturrock@nrcan.gc.ca

Jon Sweeney
NRCan, CFS
Atlantic Forestry Centre
1350 Regent Street
P.O. Box 4000
Fredericton NB
E3B 5P7
Tel.: 506-452-3499
jon.sweeney@nrcan.gc.ca

Doug Taylor
Canadian Wood Pallet and Container Association
2141 Thurston Drive
Ottawa ON
K1G 6C9
Tel.: 613-521-6468

Pierre Therrien
Ministère des Ressources naturelles et de la Faune du Québec
2700, rue Einstein, bureau D.2.370A
Québec QC
G1P 3W8
Tel.: 418-643-9679 x4753
pierre.therrien@mrnf.gouv.qc.ca

Sylvia Thomas
NRCan, ESS
588 Booth Street
Ottawa ON
K1A 0Y7
Tel.: 613-943-5247
sylvia.thomas@nrcan.gc.ca

Linda Touzin
Ontario Ministry of Natural Resources
300 Water St.
P.O. Box 7000
Peterborough ON
K9J 8M5
linda.touzin@ontario.ca

Richard Trudel
SOPFIM
1780, rue Semple
Québec QC
G1N 4B8
Tel. : 418-681-3381
r.trudel@sopfim.qc.ca

Joost Van der Sanden
NRCan, ESS
588 Booth Street
Ottawa ON
K1A 0Y7
Tel.: 613-947-1324
joost.vandersanden@nrcan.gc.ca

Nitin Verma
Canadian Food Inspection Agency
59 Camelot Drive
Ottawa ON
K1A 0Y9
Tel.: 613-773-7267
nitin.verma@inspection.gc.ca

Francine Vézina
Hydro Québec
211, boulevard Industriel
Chateauguay QC
J6J 4Z2
Tel. : 450-699-5222
vezina.francine@hydro.qc.ca

Kristjan Vitols
City of Toronto
Parks, Forestry & Recreation
355 Lesmill Road
Toronto ON
M3B 2W8
Tel.: 416-392-0432
kvitols@toronto.ca

Jan Volney
NRCan, CFS
Northern Forestry Centre
5320–122nd Street Northwest
Edmonton AB
T6H 3S5
Tel.: 780-435-7329
jan.volney@nrcan.gc.ca

Shaun Wallace
Canadian Food Inspection Agency
1400 Merivale Road
Ottawa ON
K1A 0Y9
Tel.: 613-773-5527
shaun.wallace@inspection.gc.ca

Participants

Gary Warren
NRCan, CFS, CWFC
Atlantic Forestry Centre
P.O. Box 960
Corner Brook NL
A2H 6J3
Tel.: 709-637-4912
gary.warren@nrcan.gc.ca

Doreen Watler
Canadian Food Inspection Agency
1400 Merivale Road
Ottawa ON
K1A 0Y9
Tel.: 613-773-5249
doreen.watler@inspection.gc.ca

Jim Weber
NRCan, CFS
Northern Forestry Centre
5320–122nd Street Northwest
Edmonton AB
T6H 3S5
Tel.: 780-435-7334
jim.weber@nrcan.gc.ca

Rita Weerdenburg
Canadian Nursery Landscape Association
7856 Fifth Line South
Milton ON
L9T 2X8
Tel.: 905-875-1399 x8686
ritaw@canadanursery.com

Bill Wilson
NRCan, CFS
Pacific Forestry Centre
508 West Burnside Road
Victoria BC
V8Z 1M5
Tel.: 250-363-0721
bill.wilson@nrcan.gc.ca

Richard Wilson
Ontario Ministry of Natural Resources
70 Foster Drive
Suite 400
Sault Ste. Marie ON
P6A 6V5
Tel.: 705-541-5106
richard.wilson@ontario.ca

Denys Yemshanov
NRCan, CFS
Great Lakes Forestry Centre
1219 Queen Street East
Sault Ste. Marie ON
P6A 2E5
Tel.: 705-541-5602
denys.yemshanov@nrcan.gc.ca

Aspen Zeppa
Ontario Ministry of Natural Resources
10 Campus Drive
P.O. Bag 2002
Kemptville ON
K0G 1J0
Tel.: 613-258-4072
aspen.zeppa@ontario.ca

2010 FOREST PEST MANAGEMENT FORUM

NOVEMBER 30 – DECEMBER 2, 2010
Château Cartier, Gatineau, Québec
Chaudière Ballroom

TUESDAY, NOVEMBER 30

08:00 Registration

08:20 Welcoming Remarks
Kami Ramcharan, Natural Resources Canada, Canadian Forest Service

Chair: ***Tony Hopkin**, Natural Resources Canada, Canadian Forest Service*

Session I: National Forest Pest Strategy Update

08:40 An Update of the National Forest Pest Strategy
Kami Ramcharan, Natural Resources Canada, Canadian Forest Service

Session II: Eastern Pest Management Issues

Cross-Country Checkup – Atlantic Canada

09:00 Newfoundland Report
Jim Evans, Newfoundland Department of Natural Resources

09:20 Nova Scotia Report
Gina Penny, Nova Scotia Department of Natural Resources

09:40 New Brunswick Report
Nelson Carter, New Brunswick Department of Natural Resources

10:00 Break

Chair: ***Nelson Carter**, New Brunswick Department of Natural Resources*

Session III: Eastern Pest Management Issues

Cross-Country Checkup – Central Canada

10:30 Québec Report
Louis Morneau, Ministère des Ressources naturelles et de la Faune du Québec

10:50 Ontario Report
Taylor Scarr, Ontario Ministry of Natural Resources

Session IV: North of 60 Report

Cross-Country Checkup – Northern Canada

11:10 Northwest Territories Report
Mike Gravel, Government of the Northwest Territories, Environment and Natural Resources

Session V: United States Report

11:30 Overview of forest pest conditions in the U.S.A.

Gary Man, United States Department of Agriculture, Forest Health Protection

12:00 Lunch

Chair: ***Lise Caron**, Natural Resources Canada, Canadian Forest Service*

Session VI: Forest Pathology

13:00 Early warning system against emerging diseases
Jean Bérubé, Natural Resources Canada, Canadian Forest Service

13:20 *Phytophthora ramorum* (Sudden Oak Death) - Recent studies in Canada
Simon Shamoun, Natural Resources Canada, Canadian Forest Service
Danny Rioux, Natural Resources Canada, Canadian Forest Service

13:40 White pine browning in eastern Canada and the evidence of the presence of fungal pathogens
Gaston Laflamme, Natural Resources Canada, Canadian Forest Service

14:00 Sponsor Session
Stephan Richard, Sylvar Technologies Inc.

14:10 Break

Chair: ***Michael Irvine**, Ontario Ministry of Natural Resources*

Session VII: Pesticide Regulations, Alternatives, Minor Use

14:40 Introduction
Michael Irvine, Ontario Ministry of Natural Resources

14:50 PMRA Update
Bonnie MacLeod, Pest Management Regulatory Agency

Session VIII: Invasive Species and Pesticide Regulations

15:10 Pesticides for Invasive Species Management – a Registrant's Perspective
Stephen Nicholson, Valent BioSciences Canada Limited

15:30 Pesticides for Invasive Species Management – a Provincial Perspective
Taylor Scarr, Ontario Ministry of Natural Resources

15:50 Panel Discussion

16:20 Adjourn

16:30 Forest Pest Management Forum Steering Committee Annual Meeting
(Closed Session)
Room: Cartier

Program

WEDNESDAY, DECEMBER 1

08:00 Registration

Chair: ***Taylor Scarr**, Ontario Ministry of Natural Resources*

Session IX: Western Pest Management Issues

Cross-Country Checkup – Western Canada

08:30 Manitoba Report
Irene Pines, Manitoba Conservation, Forestry Branch

08:50 Saskatchewan Report
Rory McIntosh, Saskatchewan Ministry of Environment, Forest Service Branch

09:10 Alberta Report
Dan Lux, Alberta Sustainable Resource Development, Forest Division

09:30 British Columbia Report
Janice Hodge, British Columbia Ministry of Forests and Range

09:50 Break

Chair: ***Rod Smith**, Natural Resources Canada, Canadian Forest Service*

Session X: Invasive Alien Species Research

10:20 Development of branch sampling for early detection of the emerald ash borer, *Agrilus planipennis*, in individual urban trees
Krista Ryall, Natural Resources Canada, Canadian Forest Service

10:40 Modelling trade-associated pathways of alien forest insects establishments in Canada
Denys Yemshanov, Natural Resources Canada, Canadian Forest Service

11:00 Emerald ash borer (*Agrilus planipennis*) and the brown spruce longhorn beetle (*Tetropium fuscum*): An innovative biocontrol method using autocontamination with the entomopathogenic fungus *Beauveria bassiana*
Robert Lavallée, Natural Resources Canada, Canadian Forest Service

11:20 Brown spruce longhorn beetle: current understanding of its population ecology, impact and management
Jon Sweeney Natural Resources Canada, Canadian Forest Service

11:40 Putting the NFPS on the ground: Ecological Risk Assessment for Emerald Ash Borer
Dave Kreutzweiser, Natural Resources Canada, Canadian Forest Service

12:00 Lunch

Chair: ***Richard Hamelin**, Natural Resources Canada, Canadian Forest Service*

Session XI: The TRIA Project: Genomics of the Mountain Pine Beetle System

13:00 Introduction to genomics
Anne-Christine Bonfils, National Research Council Canada, Genomics and Health Initiative

13:10 The TRIA project: Genomics of the mountain pine beetle complex
Richard Hamelin for Joerg Bohlmann, University of British Columbia

13:30 Role of drought in mediating mountain pine beetle–tree interactions: Putting theory into practice
Nadir Erbilgin, University of Alberta

13:50 Recent advances in bark beetle genomics
Chris Keeling, University of British Columbia

14:10 Genomics of the mountain pine beetle fungal associates
Richard Hamelin, Natural Resources Canada, Canadian Forest Service

14:30 Landscape-scale genomic interactions among pine, fungi, and mountain pine beetle in western Canada
Felix Sperling, University of Alberta

14:50 Can genomics feed epidemic modeling and predictions?
Barry Cooke, Natural Resources Canada, Canadian Forest Service

15:10 Break

15:40 A new Canadian Forest Service state-of-the-art insect rearing and quarantine facility
Peter Ebling, Natural Resources Canada, Canadian Forest Service

Chair: ***Louis Morneau****, Ministère des Ressources naturelles et de la Faune du Québec*

Session XII: Remote Sensing and Forest Pest Management

16:00 Operational remote sensing techniques used for monitoring pest defoliation and mortality in Québec
Antoine Leboeuf, Ministère des Ressources naturelles et de la Faune du Québec

16:20 Satellite-derived disturbance mapping in Ontario – A multi-temporal object-based Landsat approach
Ian Smyth, Ontario Ministry of Natural Resources

16:40 Mapping aspen and spruce budworm defoliation from optical fine and coarse resolution and radar satellite imagery
Ron Hall, Natural Resources Canada, Canadian Forest Service
Sylvia Thomas, Natural Resources Canada, Canada Centre for Remote Sensing
Joost van der Sanden, Natural Resources Canada, Canada Centre for Remote Sensing

* *The following report WAS NOT presented at the 2010 Forest Pest Management Forum*
Status of insects, diseases, and abiotic events affecting the health of P.E.I.'s forests in 2010
David Carmichael, P.E.I. Department of Environment Energy and Forestry

17:00 Adjourn

SCIENCE AND TECHNOLOGY À LA CARTE

Chair: ***Matt Meade***, *Canadian Institute of Forestry*
A roving, learn-while-you-eat concept
Hosted by the Canadian Institute of Forestry and Forest Pest Management Forum

17:00 – 21:30

Cash bar and roving buffet dinner; government, commercial, corporate exhibitors; science-knowledge exchange and informal poster session

Program

THURSDAY, DECEMBER 2

Emerald Ash Borer Day

08:00 Registration

Chair: ***Marcel Dawson***, *Canadian Food Inspection Agency*

09:00 Introduction and welcoming remarks
Marcel Dawson, Canadian Food Inspection Agency
Jacques Gagnon, Natural Resources Canada, Canadian Forest Service

09:10 Science Committee Update
Barry Lyons, Natural Resources Canada, Canadian Forest Service

09:30 Ontario Perspective
Taylor Scarr, Ontario Ministry of Natural Resources

09:50 Québec Perspective
Pierre Therrien, Ministère des Ressources naturelles et de la Faune du Québec

10:10 Break

10:40 Municipality Perspective
Jason Pollard, City of Ottawa

11:00 Industry Perspective
Guy Genest, Primewood Lumber

11:20 United States Update – Regulatory and Survey
Paul Chaloux, United States Department of Agriculture, Animal and Plant Health

11:40 Canada Update – Regulatory and Survey
Mireille Marcotte, Canadian Food Inspection Agency
Erin Bullas-Appleton, Canadian Food Inspection Agency

12:00 Lunch

13:00 Facilitated session – Challenges & solutions for effective EAB management (presentation and table discussions)

14:30 Break

15:00 Informal discussions and reports of items discussed during the facilitated session, and closing comments

16:00 Adjourn

FORUM 2010 SUR LA RÉPRESSION DES RAVAGEURS FORESTIERS

30 NOVEMBRE – 2 DECEMBRE 2010
Château Cartier, Gatineau (Québec)
Salle de bal Chaudière

MARDI 30 NOVEMBRE

8 h 00 **Inscription**

8 h 20 **Mot de bienvenue**
Kami Ramcharan, Ressources naturelles Canada, Service canadien des forêts

Président : ***Tony Hopkin**, Ressources naturelles Canada, Service canadien des forêts*

Séance I : Le point sur la Stratégie nationale de lutte contre les ravageurs forestiers

8 h 40 **Le point sur la Stratégie nationale de lutte contre les ravageurs forestiers**
Kami Ramcharan, Ressources naturelles Canada, Service canadien des forêts

Séance II : La répression des ravageurs dans l'Est

Tour d'horizon – Le Canada atlantique

9 h 00 **Rapport de Terre-Neuve**
Jim Evans, Newfoundland Department of Natural Resources

9 h 20 **Rapport de la Nouvelle-Écosse**
Gina Penny, Nova Scotia Department of Natural Resources

9 h 40 **Rapport du Nouveau-Brunswick**
Nelson Carter, Ministère des Ressources naturelles du Nouveau-Brunswick

10 h 00 **Pause**

Président : ***Nelson Carter**, Ministère des Ressources naturelles du Nouveau-Brunswick*

Séance III : La répression des ravageurs dans l'Est

Tour d'horizon – Le Canada central

10 h 30 **Rapport du Québec**
Louis Morneau, Ministère des Ressources naturelles et de la Faune du Québec

10 h 50 **Rapport de l'Ontario**
Taylor Scarr, Ministère des Richesses naturelles de l'Ontario

Séance IV : Au nord du 60e parallèle

Tour d'horizon – Nord du Canada

11 h 10 **Rapport des Territoires du Nord-Ouest**
Mike Gravel, Government of the Northwest Territories, Environment and Natural Resources

Programme

Séance V : Rapport des États-Unis

11 h 30 Survol des insectes et des maladies des arbres aux États-Unis
Gary Man, United States Department of Agriculture, Forest Health Protection

12 h 00 Déjeuner

Présidente : ***Lise Caron**, Ressources naturelles Canada, Service canadien des forêts*

Séance VI : Pathologie forestière

13 h 00 Système d'alerte rapide pour les maladies émergentes
Jean Bérubé, Ressources naturelles Canada, Service canadien des forêts

13 h 20 Le *Phytophthora ramorum*, agent causal de l'encre des chênes rouges – Études récentes au Canada
Simon Shamoun, Ressources naturelles Canada, Service canadien des forêts
Danny Rioux, Ressources naturelles Canada, Service canadien des forêts

13 h 40 Le brunissement des aiguilles du pin blanc de l'est du Canada et l'évidence de la présence de champignons pathogènes
Gaston Laflamme, Ressources naturelles Canada, Service canadien des forêts

14 h 00 Séance des commanditaires
Stephan Richard, Sylvar Technologies Inc.

14 h 10 **Pause**

Président : ***Michael Irvine**, Ministère des Richesses naturelles de l'Ontario*

Séance VII : Règlements sur les pesticides, solutions possibles, usage limité

14 h 40 Présentation
Michael Irvine, Ministère des Richesses naturelles de l'Ontario

14 h 50 Mise à jour ARLA
Bonnie MacLeod, Santé Canada, Agence de réglementation de la lutte antiparasitaire

Séance VIII : Espèces envahissantes et réglementation sur les pesticides

15 h 10 Des pesticides pour lutter contre les espèces envahissantes – Le point de vue d'un détenteur d'homologation
Stephen Nicholson, Valent BioSciences Canada Limited

15 h 30 Des pesticides pour lutter contre les espèces envahissantes – Le point de vue provincial
Taylor Scarr, Ministère des Richesses naturelles de l'Ontario

15 h 50 Discussions en groupe

16 h 20 Ajournement des travaux

16 h 30 Comité directeur du Forum sur les ravageurs
(Séance privée)
Salle : Cartier

Programme

MERCREDI 1er DÉCEMBRE

8 h 00 Inscription

Président : ***Taylor Scarr***, *Ministère des Richesses naturelles de l'Ontario*

Séance IX : La répression des ravageurs dans l'Ouest

Tour d'horizon – l'Ouest canadien

8 h 30 Rapport du Manitoba
Irene Pines, Manitoba Conservation, Forestry Branch

8 h 50 Rapport de la Saskatchewan
Rory McIntosh, Saskatchewan Ministry of Environment, Forest Service Branch

9 h 10 Rapport de l'Alberta
Dan Lux, Alberta Sustainable Resource Development, Forest Division

9 h 30 Rapport de la Colombie-Britannique
Janice Hodge, British Columbia Ministry of Forests and Range

9 h 50 Pause

Président : ***Rod Smith***, *Ressources naturelles Canada, Service canadien des forêts*

Séance X : Recherche sur les espèces exotiques envahissantes

10 h 20 Développement d'un échantillonnage de branches pour la détection précoce de l'agrile du frêne, *Agrilus planipennis*, dans les arbres en milieu urbain
Krista Ryall, Ressources naturelles Canada, Service canadien des forêts

10 h 40 Modélisation des voies d'introduction associées au commerce et menant à l'établissement au Canada d'insectes forestiers exotiques
Denys Yemshanov, Ressources naturelles Canada, Service canadien des forêts

11 h 00 L'agrile du frêne (*Agrilus planipennis*) et le longicorne brun de l'épinette (*Tetropium fuscum*) : une approche nouvelle de contrôle biologique par l'autocontamination avec le champignon entomopathogène *Beauveria bassiana*
Robert Lavallée, Ressources naturelles Canada, Service canadien des forêts

11 h 20 Le longicorne brun de l'épinette : état actuel des connaissances sur l'écologie de ses populations, sur ses impacts et sur sa répression
Jon Sweeney, Ressources naturelles Canada, Service canadien des forêts

11 h 40 Mise en œuvre sur le terrain de la Stratégie nationale de lutte contre les ravageurs forestiers : évaluation des risques écologiques posés par l'agrile du frêne
Dave Kreutzweiser, Ressources naturelles Canada, Service canadien des forêts

12 h 00 Déjeuner

Président : ***Richard Hamelin***, *Ressources naturelles Canada, Service canadien des forêts*

Séance XI : Le projet TRIA : Génomique du dendroctone du pin ponderosa

13 h 00 Introduction à la génomique
Anne-Christine Bonfils, Conseil national de recherches Canada, Bureau de coordination de l'initiative en génomique et en santé du Conseil national de recherches du Canada

13 h 10 Le projet TRIA : Génomique du complexe du dendroctone du pin ponderosa
Richard Hamelin pour Joerg Bohlmann, University of British Columbia

13 h 30 Rôle de la sécheresse dans les interactions entre le dendroctone du pin ponderosa et l'arbre : de la théorie à la pratique
Nadir Erbilgin, University of Alberta

13 h 50 Progrès récents de la génomique du dendroctone
Chris Keeling, University of British Columbia

14 h 10 Génomique des associés fongiques du dendroctone du pin ponderosa
Richard Hamelin, Ressources naturelles Canada, Service canadien des forêts

14 h 30 Le dendroctone du pin ponderosa et ses associés fongiques dans l'Ouest canadien
Felix Sperling, University of Alberta

14 h 50 La génomique peut-elle contribuer à la modélisation et aux prévisions des infestations?
Barry Cooke, Ressources naturelles Canada, Service canadien des forêts

15 h 10 Pause

15 h 40 Une nouvelle installation ultramoderne de quarantaine et d'élevage des insectes au Service canadien des forêts
Peter Ebling, Ressources naturelles Canada, Service canadien des forêts

Président : ***Louis Morneau**, Ministère des Ressources naturelles et de la Faune du Québec*

Séance XII : Télédétection et répression des ravageurs forestiers

16 h 00 Techniques opérationnelles de télédétection utilisées pour la surveillance de la défoliation et de la mortalité dues aux ravageurs au Québec
Antoine Lebocuf, Ministère des Ressources naturelles et de la Faune du Québec

16 h 20 Application de la télédétection par satellite à la cartographie des perturbations en Ontario – Une approche multitemporelle basée sur les objets à l'aide d'images Landsat
Ian Smyth, Ministère des Richesses naturelles de l'Ontario

16 h 40 Cartographie de la défoliation causée par la tordeuse des bourgeons de l'épinette et du dépérissement du peuplier faux-tremble à l'aide d'images satellites radars et optiques à haute et basse résolutions
Ron Hall, Ressources naturelles Canada, Service canadien des forêts
Sylvia Thomas, Ressources naturelles Canada, Centre canadien de télédétection
Joost van der Sanden, Ressources naturelles Canada, Centre canadien de télédétection

* *Le rapport ci-dessous n'a pas été présenté lors du Forum*
Insectes, maladies et événements abiotiques affectant la santé des forêts de l'Î.-P.-É. en 2010
David Carmichael, P.E.I. Department of Environment Energy and Forestry

17 h 00 Ajournement des travaux

SCIENCE ET TECHNOLOGIE À LA CARTE

Président : ***Matt Meade***, *Institut forestier du Canada*

Un concept qui vous permet de vous déplacer et d'apprendre tout en profitant d'un excellent buffet. Un événement organisé par l'Institut forestier du Canada et le Forum sur la répression des ravageurs forestiers.

17 h 00 – 21 h 30

Bar payant et buffet; exposants du gouvernement, du secteur commercial et de l'entreprise privée; échanges de connaissances scientifiques et séance de présentations d'affiches.

Programme

JEUDI 2 DÉCEMBRE

Journée de l'agrile du frêne

8 h 00 **Inscription**

Président : *Marcel Dawson, Agence canadienne d'inspection des aliments*

9 h 00 **Introduction et mot de bienvenue**
Marcel Dawson, Agence canadienne d'inspection des aliments
Jacques Gagnon, Ressources naturelles Canada, Service canadien des forêts

9 h 10 **Mise à jour du Comité scientifique**
Barry Lyons, Ressources naturelles Canada, Service canadien des forêts

9 h 30 **Le point de vue de l'Ontario**
Taylor Scarr, Ministère des Richesses naturelles de l'Ontario

9 h 50 **Le point de vue du Québec**
Pierre Therrien, Ministère des Ressources naturelles et de la Faune du Québec

10 h 10 **Pause**

10 h 40 **Le point de vue des municipalités**
Jason Pollard, Ville d'Ottawa

11 h 00 **Le point de vue de l'industrie**
Guy Genest, Primewood Lumber

11 h 20 **Le point sur la situation aux États-Unis – Réglementation et enquêtes**
Paul Chaloux, United States Department of Agriculture, Animal and Plant Health

11 h 40 **Le point sur la situation au Canada**
Mireille Marcotte, Agence canadienne d'inspection des aliments
Erin Bullas-Appleton, Agence canadienne d'inspection des aliments

12 h 00 **Déjeuner**

13 h 00 **Séance dirigée – Enjeux et solutions pour une répression efficace de l'agrile du frêne (présentation et discussions en groupes)**

14 h 30 **Pause**

15 h 00 **Discussions informelles et comptes rendus des thèmes discutés lors des sessions animées et commentaires de clôture**

16 h 00 **Ajournement des travaux**

SESSION I: NATIONAL FOREST PEST STRATEGY UPDATE

Chair: ***Tony Hopkin***
Natural Resources Canada, Canadian Forest Service

SEANCE I : LE POINT SUR LA STRATEGIE NATIONALE DE LUTTE CONTRE LES RAVAGEURS FORESTIERS

Président : **Tony Hopkin**
Ressources naturelles Canada, Service canadien des forêts

NATIONAL FOREST PEST STRATEGY UPDATE

Kami Ramcharan

Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre
506 West Burnside Road
Victoria, BC V8Z 1M5

Abstract

It is a transitional year for the National Forest Pest Strategy (NFPS). The recent restructuring of the Canadian Council of Forest Ministers added to a review of the Strategy's implementation plan will require challenging decisions to further develop and enhance national collaboration on forest pest management in Canada. From the current context emerge promising opportunities for strategic collaboration at the national level.

This presentation will provide an update on the ongoing activities of the NFPS. Specific reference will be made to the roles of the NFPS new technical coordinator in support to technical work in key components of the Strategy. The implementation plan review process and the way forward for the Strategy will finally be discussed.

Résumé

C'est une année de transition pour la Stratégie nationale de lutte contre les ravageurs forestiers (SNLRF). La récente restructuration du Conseil canadien des ministres des forêts, s'ajoutant à un examen du plan de mise en œuvre de la Stratégie, imposent des décisions importantes afin de poursuivre le développement et le renforcement de la collaboration nationale sur la gestion des ravageurs forestiers au Canada. Des opportunités prometteuses émergent du contexte actuel pour une collaboration stratégique sur le plan national.

Cette présentation fournira une mise à jour sur les activités en cours de la SNLRF. Un accent particulier sera mis sur les rôles du nouveau coordonnateur technique de la SNLRF en appui au travail technique dans les principales composantes de la Stratégie. Le processus d'examen du plan de mise en œuvre et les perspectives d'avenir pour la Stratégie seront finalement abordés.

SESSION II: EASTERN PEST MANAGEMENT ISSUES

SEANCE II : LA REPRESSION DES RAVAGEURS DANS L'EST

NEWFOUNDLAND & LABRADOR 2010 FOREST INSECT AND DISEASE CONTROL PROGRAM

James Evans

Newfoundland Department of Natural Resources
P.O. Box 2006
Fortis Building
Corner Brook, NL A2H 6J8

Abstract

Forest Insect Pest Management

Forest insect pest management continues to be an important component of sustainable forest management. The Province through the Forestry and Agrifoods Agency – Forestry Services Branch actively monitors significant forest insect pests and applies control measures where and when required to minimize their negative effects on the forest resource. Pest management also benefits other values derived from healthy forest ecosystems including preserving habitat for many other organisms, water quality, minimizing potential soil erosion, ecotourism values, and more. In applying control measures, the Forestry Services Branch uses the most effective means with the least non-target environmental impacts and operating under all required licenses and permits.

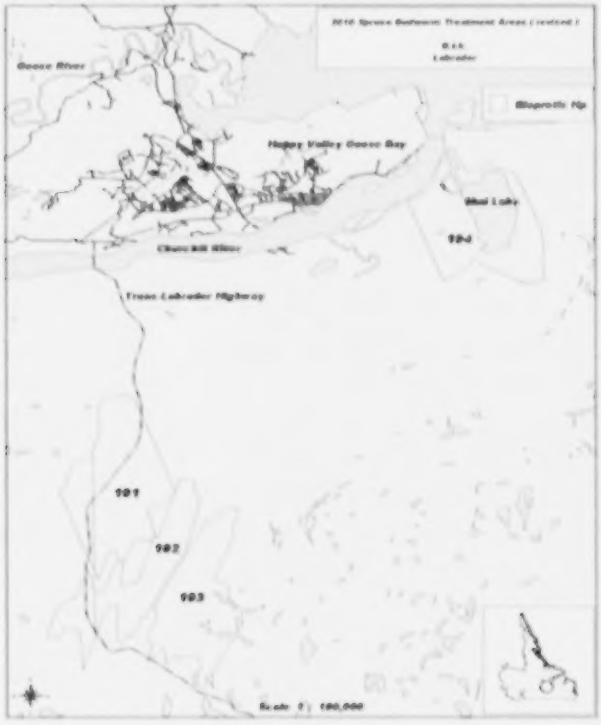
The province continues to experience a number of insect infestations. On-going infestations of three major forest insect defoliators were predicted for 2010. Aerial defoliation surveys in association with egg mass surveys indicated significant Hemlock Looper populations in Western and Northern Newfoundland. In addition, a Spruce Budworm outbreak was observed in Labrador and Balsam Fir Sawfly continued to be a concern but of a lesser degree in managed stands in Western portions of the island.

Spruce Budworm

The last incidence of aerially detected infestation in the province was recorded in 1992 in the Crabbes River – Codroy Pond area on the west coast of the Island. The last infestation of spruce budworm in Labrador was in the mid-1970s. In 2006, an infestation was reported south of Happy Valley-Goose Bay in Labrador in balsam fir and white spruce forests in the Traverspine

River area. The infestation continued and in 2010 approximately 55,000 hectares of moderate and severe infestation were forecast on Innu Lands south of the Churchill River.

A decision was made to treat the areas with Btk and in mid June approximately 14,000 hectares was treated with Bioprotec HP at 1.5 litres/hectare. Approximately 10,600 hectares received a second application of the same product at the same rate.

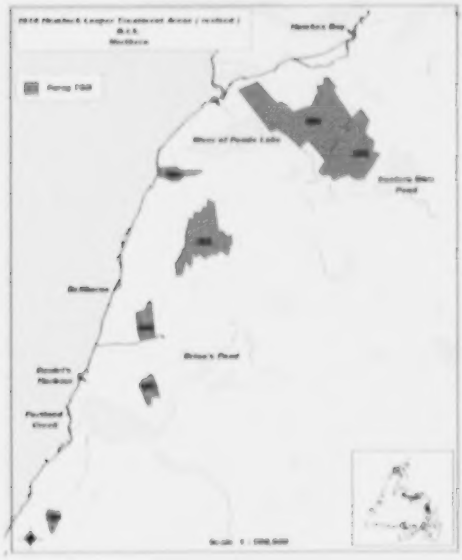


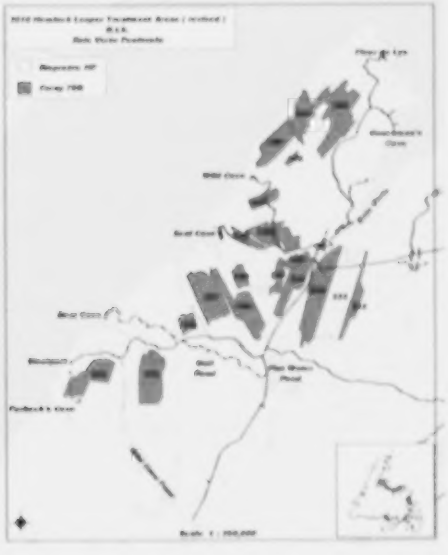
Hemlock Looper

ISLAND: Approximately 64,000 hectares of moderate and severe Hemlock Looper infestation were forecast for 2010 in western and northern portions of the Island. The actual treatment area was reduced to 31,600 hectares due to insect counts, terrain, etc. The location of treatment areas were in the White's River, Northern Peninsula and Baie Verte areas. Two variations of the registered insecticide Btk were utilized in the protection program with the breakdown of each as follows:

29,100 Hectares treated with Foray 76B @ 2 Litres/Hectare

2,500 Hectares treated with Bioprotec HP @ 2 Litres/Hectare





LABRADOR: The Hemlock Looper population in southern Labrador declined to the point where no control program was necessary in 2010. The areas continue to be monitored for insect development.

Balsam Fir Sawfly

The Balsam Fir Sawfly infestation in western Newfoundland in the general Deer Lake area declined with approximately 4,600 hectares of moderate and severe area forecast for 2010. There was no control program for this insect due to the declining population, planned harvest blocks in the forecast area and the fact that the infestation was moving into Gros Morne National Park.

Surveys

As with any Forest Insect Protection Program, various surveys were conducted to detect, monitor and map the presence and extent of forest pests in the Province. Surveys conducted in 2010 included:

Defoliation Surveys

Egg Mass Surveys

Pre and Post Treatment Surveys

Pheromone Trap Plots (Spruce Budworm)

Spruce Bark Beetle Plots

Pine Shoot Moth Plots (Red Pine Plantations)

Summary

The Forestry Services Branch, in partnership with the forest industry, continues to monitor and control significant insect pests if required. In addition there is a commitment to partner with the Canadian Forest Service, universities and others to research these pests and to encourage development of alternate control measures (under an integrated pest management approach) that are both effective and have the least impacts (if any) on human health and the environment. The Branch also consults and interacts with various other jurisdictions and agencies to remain current on potential and on-going problems and new developments in forest pest management.

Summary of Forest Pest Conditions in Nova Scotia – 2010

Gina Penny

Nova Scotia Department of Natural Resources, Risk Services Unit
P.O. Box 130
Shubenacadie, NS B0N 2H0

Abstract

The spruce budworm (*Choristoneura fumiferana*) has caused more damage to Nova Scotian softwood forests than any other insect. Since the last outbreak in the 1970's, spruce budworm population levels have decreased dramatically, with low moth catches being recorded in the Eastern and Central Regions of the province. In 2010, 57% of pheromone traps were positive, twice the amount positive in 2009 and the highest percentage we've seen since 1994. This year marks the second year in a row where we've seen the percentage of positive traps increase. Our L2 survey is in progress.

Defoliation of mature white pine by jack pine budworm (*Choristoneura pinus pinus*) was first detected in the Western Region in 2005. The following year, pheromone traps were used to monitor this emerging population. Between 2006 and 2009 the percentage of positive traps remained above 75%. Currently, at 36.4% this number has dropped by more than half. Overtime the average number of moths per trap has also fallen; originally at a high of eight moths we are now collecting less than one moth per trap. No overwintering larvae were detected during our branch surveys. However, due to budget constraints, only 15 sites were surveyed for overwintering larva. These sites were in areas with high populations in 2009. Forest Health is currently collaborating with the CFS to improve our monitoring and forecasting methods for this insect.

Eastern blackheaded budworm (*Acleris variana*) eggs were detected at 74% of the sites surveyed in the Eastern Region in 2010. This is a dramatic increase from 5.5% in 2009. However, egg numbers remain unchanged since 2008, with the maximum numbered of eggs found during sampling never exceeding five.

Spruce beetle (*Dendroctonus rufipennis*) activity in Nova Scotia has been both chronic and widespread. We're seeing mortality of mature and over-mature white and red spruce throughout

the province. Recent mild winters have increased spruce beetle winter survival leading to a tremendous population buildup. Damage is occurring predominantly in areas where farm abandonment was common and where fields and pastures have regenerated into old field white spruce. During our provincial aerial overview survey, spruce beetle damage and mortality was recorded on a total of 15,488 hectares. Forest Health also utilizes an array of 18, long term, fixed radius plots to track spruce beetle populations in red and white spruce stands. When plots were surveyed in 2010, 44.8% of white spruce and 10% of red spruce were either infested with or had been killed by spruce beetle. This is an increase from 2009 when the percent of infested or beetle killed trees were 30.8% and 3.8% for white and red spruce respectively.

Recorded outbreaks of the balsam fir sawfly (*Neodiprion abietis*) in Nova Scotia date back to 1942. Defoliation last occurred in 2000 in Victoria County. New balsam fir sawfly damage was detected in the Eastern Region in 2009. A total of 35.5 hectares were defoliated in Guysborough County with 30 hectares classified as moderate to severe. Our overview aerial survey detected 1,272 hectares of moderate to severe defoliation in this area again in 2010. Our overwintering egg survey was expanded to include 127 sites, 51% of which were positive, up from 6.5% in 2009 and the highest percentage we've seen since 1999.

Since 1961 the hemlock looper (*Lambdina fiscellaria fiscellaria*) has defoliated approximately 135,000 hectares in Nova Scotia. Control programs were conducted in the Cape Breton Highlands in 1996 and 1997. Since then hemlock looper numbers have remained low. 2010 pheromone trap and overwintering egg survey data indicate no great change in that status. Percent positive traps increased from 84.2% in 2009 to 93.9% in 2010 while the mean trap catch decreased slightly from 20.2 to 19.8. Eggs were detected at 10% of sites sampled, up from 0% in 2009 and 9.8% in 2008.

An overwintering egg mass survey was conducted for whitemarked tussock moth (*Orgyia leucostigma*) with 296 sites sampled across the province. The percentage of sites where egg masses were detected has remained relatively stable at 7.8% in 2010 and 7.6% in 2009.

The pale winged grey (*Iridopsis ephyraria*) is normally a general plant feeder with no prior record of outbreak in Nova Scotia. In 2002 it caused heavy defoliation of eastern hemlock in Kejimkujik National Park. Currently, in the areas it is known to occur, the population appears to be collapsing.

The brown spruce longhorn beetle (*Tetropium fuscum*), an insect native to Europe, arrived in Halifax in the 1990's. This is the only known occurrence of this beetle in North America. As part of a joint effort the Nova Scotia Department of Natural Resources works with the Canadian Food Inspection Agency and Canadian Forest Service to monitor the spread of the beetle within Nova Scotia. The 2010 trapping survey resulted in 13 new positives sites taking the number of positive sites outside of the beetle containment area to 59. The majority of positive results for the 2010 survey are within the generally infested area. Overall there was no large increase in the numbers of beetles collected. Additional pheromone traps were also deployed throughout Eastern Canada in New Brunswick, Prince Edward Island, Newfoundland and Labrador, and Quebec; all were negative for brown spruce longhorn beetle.

In 1995, Forest Health established a pheromone monitoring system to detect gypsy moth (*Lymantria dispar*) in Nova Scotia. Our survey is conducted in two parts.

Multipher traps are deployed at designated sites province wide to monitor population trends. In 2010, 58% were positive down slightly from 61% the year before with a total of 3093 moths caught up from 2545 recorded in 2009. Based on our survey results increases in moths captured were detected in five counties. Four within the CFIA regulated zone - Annapolis, Halifax, Kings, and Lunenburg - as well as Pictou located just outside the zone. Delta traps are also placed in towns outside the regulated zone to determine if the population is spreading into new areas where it wasn't previously detected. The only town that continues to show a population increase is New Glasgow in Pictou County. The average number of moths caught has been on the rise in New Glasgow since 2000. However, this year we saw that number decrease.

Introduced into North America from Europe, the balsam woolly adelgid (*Adelges piceae*) is an important pest of true firs. In the fall of 2009 Forest Health established 14 permanent adelgid monitoring plots. These plots are located within the nine provincial ecoregions and whenever possible, paired with existing Forest Inventory research permanent sample plots in order to compare the impact of the adelgid on the growth, volume and yield of balsam fir in Nova Scotia. Each spring, adult adelgid populations are measured and overall tree condition is rated. Tree height and diameter are measured every other year. A data logger was placed in each plot to measure yearly temperatures as mortality of overwintering nymphs increase as temperatures dip below -20°C and temperatures of -30°C or lower are fatal. Our current baseline plot data found very few adelgid adults per plot. Based on the temperature data collected, nymph

mortality is not likely as temperatures only fell below -20°C for as few as two but for no more than four days.

In cooperation with the Canadian Food Inspection Agency and their survey efforts, Forest Health staff conducted detection surveys for hemlock woolly adelgid (*Adelges tsugae*) in forested areas, 15 remote hemlock stands, in the Western Region. All were negative for this non-native pest.

In the late spring of 2010, Forest Protection was petitioned to conduct a detailed aerial survey of Sirococcus shoot blight (*Sirococcus conigenis*) in red pine plantations in the St. Mary's watershed. This survey data was used by Crown lease holders to assist in their salvage efforts. During this survey a total of 1,538 hectares were found to be infected; the bulk of this being moderate to severe. Later in 2010, our provincial aerial overview survey detected light to moderate Sirococcus damage on a total of 10,092 hectares in both the Western and Central Regions.

Preliminary Summary of Forest Pest Conditions in New Brunswick in 2010 and Outlook for 2011

Nelson Carter, L. Hartling, D. Lavigne, J. Gullison, D. O'Shea, J. Proude, R. Farquhar, and D. Winter
M. Lewis, M. Stewart, E. Moreau, D. Niblett, and S. Toole

Department of Natural Resources
Forest Pest Management Section
1350 Regent Street
Fredericton, NB E3C 2G6

Abstract

Spruce Budworm

In 2010, the percent of positive pheromone traps increased to 68% from 55% last year and the Provincial mean trap catch increased slightly to 4.83 moths/trap. Admittedly this not a high number though it is the highest since operational pheromone trapping began in 1995 when the last outbreak was subsiding. Also of interest is that other numeric increases, albeit very low, were noted throughout the Province, with the greatest increases in the northwest. Analysis of the 16-year's of pheromone trap data continue to suggest an overall increasing trend within these low populations. In 2010, only 4 of the 102 overwintering larval survey plots were positive and yielded a total of 8 L2 larvae. No defoliation is forecast for 2011. Defoliation by spruce budworm in New Brunswick was last recorded in 1995 when the last outbreak subsided.

Jack Pine Budworm

Populations remain at very low levels according to pheromone trap catches since 1997. No defoliation is expected in 2011.

Hemlock Looper

In 2010, the maximum pheromone trap catch reached its second lowest level since this monitoring system began and the mean trap catch reached its lowest point. Hemlock looper populations, which have progressively declined since 2004, remained at very low levels in 2010 and no defoliation is forecast for 2011. Nonetheless, yearly increases and trend analyses are worth doing

Whitemarked Tussock Moth

No defoliation was forecast for 2010 and none was detected. There was, however, an unexpected 'jump' in pheromone trap catches; but numbers still do not suggest defoliation in 2011. Due to other priorities there was no follow-up searching to look for egg masses or evidence of other life stages.

Rusty Tussock Moth

No defoliation was expected in 2010, and none was detected. Nonetheless, pheromone trap catches unexpectedly increased in 2010, though numbers are not sufficient enough to expect defoliation in 2011.

Balsam Twig Aphid

In 2010, populations of balsam twig aphid declined to only 24% of the plots being positive. This is down from 40% in 2009 and 66% in 2008. The percent of positive sites has fluctuated in this general range over the past five years, hence it was uncertain whether populations would increase or decrease in 2010. Population trends for balsam twig aphid have been a challenge to predict with any certainty. Nonetheless, data from the last three years tend to suggest that populations will likely continue to decline in 2011.

Balsam Gall Midge

In 2010, balsam gall midge was detected on fir branches at 94% of the plots which surpassed the peaks of the last two "outbreaks" (i.e., 61% in 1990 and 71% in 1998) which declined somewhat precipitously after three years. Overall, the survey data indicate that population trends for this insect are more straightforward to interpret; hence, the historical outbreak patterns suggest that gall midge populations will remain high for yet another year.

Balsam Woolly Adelgid

Results from the spring over wintering survey at 12 monitoring sites indicated decreases in populations from last year at 5 locations, no change at 4 locations, and an increase at 3 locations. Population increases had been anticipated because of the mild winter of 2009-10. It is speculated that warmer than normal temperatures early in the spring followed by freezing temperatures may have caused mortality of insects that had already broken diapause. Assessment of tree damage at these sites and 83 (of 260) sites originally assessed for damage in 2002 indicated no rapid decline in tree condition. The incidence of damage and severity has predominantly remained the same, though some increased damage was noted as well as some recovery. Galling and distorted tops are

common on balsam fir in southern New Brunswick, but we have yet to encounter areas displaying significant stem attack – a condition more commonly associated with rapid tree decline and mortality.

Brown Spruce Longhorn Beetle

This invasive insect has not yet been detected in New Brunswick despite significant increases in the distribution of this pest in Nova Scotia within the past few years. Trapping surveys in New Brunswick have been conducted by the CFIA. New Brunswick's forest industry extended its importation moratorium on regulated spruce materials from Nova Scotia in 2010. Management actions for 2011 are yet to be determined pending meetings this winter between the CFIA and forest industry stakeholders. In 2009, FPMS staff visited Nova Scotia to obtain training on field detection and lab identification of BSLB through funds provided by the National Forest Pest Strategy (Natural Resources Canada – Canadian Forest Service). Part of the training was to learn how to identify symptoms associated with BSLB attacked trees. In 2010, FPMS crews put this training to use by coincidentally examining spruce trees during other spruce budworm and balsam woolly adelgid surveys at 328 locations across the Province (i.e., 245 and 83 locations, respectively). A directed BSLB survey was also conducted to examine spruce trees in 97 spruce stands in south-eastern New Brunswick and spruce trees around 14 spruce importing facilities/holding-areas. Overall 439 locations were examined for BSLB as part of early detection efforts in New Brunswick. No suspect BSLB trees were identified at any location. This effort greatly supplemented the survey work done by the CFIA in New Brunswick in 2010.

Pine Shoot Beetle

This invasive insect has not yet been detected in New Brunswick. Surveys are conducted by the CFIA.

Pine Leaf Adelgid

In 2010, no damage on white pine was observed. This insect causes damage mainly on white pine, but alternates its life-cycle on red/black spruce. Damage on white pine is most evident in alternating years. In 2005, widespread attack was noted on white pine in central and eastern New Brunswick. Damage on white pine was generally much less evident in 2006. In 2007, widespread damage was again apparent within the same areas, as well as other parts of the Province and a preliminary damage assessment survey was conducted along with observations on the insect's life cycle. In 2008, no damage was seen on white pine, but observations confirmed the presence of new galls on red/black spruce and the presence of winged adults and immature life-stages of the

adelgid on current shoots of white pine. In 2009 as anticipated, damage was again observed on white pine, particularly within white pine management areas in central New Brunswick. If populations of this pest still persist, damage should be evident again on white pine in 2011.

Hemlock Woolly Adelgid

FPMS conducted its first survey for this pest in selected hemlock stands in 2005 (30 stands) and again in 2007 (52 hemlock stands), but no signs or symptoms of attack were detected. No surveys were conducted by FPMS in 2008 or 2009; or in 2010.

European Larch Canker

This disease is known to be present throughout south-eastern New Brunswick and has been occasionally surveyed by the CFS in the past. No specific surveys have been done since 2000.

Scleroderris Canker of Pine

Surveys for this disease were not conducted in 2010. The European race of Scleroderris was once thought to occur at about a dozen sites in New Brunswick, but newer testing methods used by the CFS confirmed only three sites to be positive. These occur in north-western New Brunswick within a few kilometres of each other. Two sites contain Scots pine and the other is red pine. In 2008, dead trees and trees with dead and dying tops were easily seen at the second site (Scots pine). At the third site, the red pine looked remarkably healthy. Quarantine regulations are in place under the federal *Plant Protection Act* administered by the CFIA. No specific survey was conducted in 2010.

Sirococcus Shoot Blight on Red Pine

From time to time, isolated stands of red pine with damage from Sirococcus shoot blight have been identified in New Brunswick. In 2008, two stands – one in north-western New Brunswick and one in south-western New Brunswick – had mortality and damage caused by Sirococcus. In 2010, three small areas of damage were detected in southern NB during the aerial survey.

Needle Blight on White Pine

In 2009, discoloration on white pine foliage was noticed throughout much of the Province. Based on symptomology it was surmised that the causal agent was Dook's Needle Blight (*Lophophacidium dooksi*). Unfortunately, due to the retirement of the local forest pathologist at the CFS-Atlantic at the time this was happening, assistance in culturing samples was not readily available to confirm a proper diagnosis. Symptoms of damage were not as widespread in 2010. In

June 2010, foliage samples were collected and submitted to the CFS Laurentian Forest Research Centre who subsequently advised that they found the fungus *Canavirgella banfieldii* which they think is synonymous as *Lophophacidium dooksii*.

Gypsy Moth

The overall spring estimate of the 2009-10 over-winter egg survival of gypsy moth in southern New Brunswick was 79% (based on 6 sites sampled). Given the mild temperatures during the winter, this was a stark contrast to the 26% egg survival after the very cold winter of 2008-09. Despite higher egg survival, no defoliation was forecast for 2010 and none was detected. Not surprisingly, results from the Provincial early detection pheromone trap survey revealed a small increase in mean trap catches to 46 moths/trap in 2010 from 42 moths/trap in 2009. Likewise, pheromone traps used to monitor low density populations in southern New Brunswick also had a small increase in mean trap catch up to 272 moths/trap in 2010 from 246 moths/trap in 2009. A small increase in the number of new egg masses found at plots monitored annually since 1995 was also noted - a mean of 7 new egg masses/person-hour searching in 2010 compared to a mean of 5 new egg masses/person-hour searching in 2009.

These small increases are not expected to lead to noticeable defoliation in 2011. Survey results continue to indicate that much of the northern part of the Province still remains free of this pest. Nonetheless, one new location (Rogersville) with life-stages other than male moths was observed outside the area currently regulated by the Canadian Food Inspection Agency.

Forest Tent Caterpillar

Defoliation occurred in 2010 but was not expected despite the increase in pheromone trap catches in 2009. Defoliation was observed in north-eastern and south-central New Brunswick over a total of ~2 000 hectares. Despite these localized areas of defoliation, Province-wide pheromone trap catches decreased slightly to 3.7 moths/trap in 2010 from 5.8 moths/trap in 2009. Additional trapping was also conducted at three of the defoliated areas to gather other information. Surprisingly moth catches only ranged from 5 to 12 moths/trap though higher numbers were anticipated. Natural controls and the ability of female moths to out compete the pheromone lure used for trapping are suspected as the main reasons. Observations indicated that the flight period lasted about 5-weeks. Accumulated degree-days (base 3°C starting March 1st) were 456 when first cocoons were observed and ranged from 675 to 799 degree-days for first moths. A limited egg survey conducted at 7 sites within or just outside the defoliated areas found sufficient egg bands to forecast light to moderate defoliation at four sites and moderate to severe defoliation at one site in 2011.

Large Aspen Tortrix

In 2010, defoliation was reported in the vicinity of Woodstock and Florenceville in western New Brunswick. High populations of this insect are rare in the Maritimes and are usually associated with localized outbreaks of short duration. In 2007, ground surveys and aerial reconnaissance detected small but widespread patches of trembling aspen defoliation in the northern half of the Province. In 2008, ground surveys again detected defoliation in these areas as well as an area north of Tracy Depot. In 2009, populations appeared to collapse with no visible signs of defoliation.

Fall Cankerworm

In 2010, there were limited observations of this pest in New Brunswick (e.g., Mactaquac area).

Butternut Canker

Since this disease was first confirmed present in New Brunswick by the CFS in 1997, they have confirmed its presence at a total of 18 locations. Due to the retirement of the forest pathologist at the CFS-Atlantic Forest Research Centre in 2009, it is uncertain how the future progress of this disease will be reported. Butternut is not a major component of our native forests, nor is it of major economic importance, but the disease could pose a threat to our natural forest biodiversity. In 2005, butternut trees were put on the Endangered List under the Canadian *Species at Risk Act*, partly because of the presence of butternut canker.

Assessments in Plantations and Thinnings

In 2010, Regional Pest Detection Officers made assessments in 303 stands including 153 plantations and 150 thinnings. Only 28 (9%) of the stands surveyed had >30% of assessed trees with signs of pest damage. The most common pests reported were: white pine weevil; balsam gall midge; birch leaf miner; and pitch nodule maker. In addition, branch "tipping" for the making of Christmas wreath was also evident.

Monitoring in DNR's Seed Orchards and Tree Nursery

In 2010, routine pest monitoring was conducted in DNR's first- and second-generation seed orchards (mostly located in the Fredericton area). Very few cones were produced at any spruce orchard; hence, no cone maggot egg sampling was necessary. No damage by any defoliators was detected. Pheromone trap surveys for spruce budworm and jack pine budworm showed that they

pose no threat in 2011. Although cones were produced on a few trees in the balsam fir stand at Queensbury, sampling in July showed heavy damage on 61% of the cones by cone maggot and fir coneworm. White pine weevil damage was evident again in the Norway spruce stand at Queensbury and dead leaders were found on several dozen trees.

There were a number of pest enquiries from DNR's Kingsclear forest tree nursery in 2010. Damage by Lygus bug was found in white pine seedlings; black spruce seedlings in a holding area had evidence of cutworm damage; and crickets damaged seedlings in one greenhouse complex. Several other enquiries involved abiotic problems (i.e., heat damage causing swelling just above the root collar of red spruce seedlings causing them to break). Damage typical of seedling debarking weevil attack was reported in some plantations.

MISCELLANEOUS

Aerial Survey

In 2010, a total of 33.8 hours of flying time were used for the aerial survey. Poor weather caused gaps in the survey in the southern part of the Province. Although no major areas of defoliation were seen, pockets of damage were mapped for: forest tent caterpillar, greenstriped mapleworm, balsam fir sawfly, beech bark disease, Sirococcus, and birch leaf miner. Aerial observations from other sources indicated spruce beetle damage and possibly acid fog near the Fundy coast.

Other

In 2010, there were reports of a number of miscellaneous insects and diseases. Balsam gall midge was reported to be very heavy in places. Large aspen tortrix occurred in pockets in western New Brunswick. Larch casebearer was reported south of Meductic and near Plaster Rock. Satin moth defoliation was seen in Fredericton. Hickory tussock moth was reported more frequently than usual. Samples of black spruce seedlings displaying girdling damage typical of seedling debarking weevil attack were received from several plantations. This insect has not been reported as a significant problem in the past in NB.

Several red pine sites in south-eastern New Brunswick displayed symptoms typical of Sirococcus shoot blight. Scattered pockets of balsam fir exhibited symptoms of balsam fir shoot blight and red flag. Spruce needle rust was also common in many areas; as was tar spot on maple. Ash trees in many areas (e.g., Fredericton) displayed symptoms of Athracnose.

Ticks and Lyme Disease

In 2010, four black-legged ticks were identified by FPMS and submitted to Health Canada in Winnipeg for testing. The first specimen, found in late May, tested negative for the Lyme disease bacterium. One submission, consisting of three specimens, was received in late October. These originated from the same general location in southern New Brunswick as the specimen from May. Test results from those specimens have yet to be received at this time. Since 1999, small numbers of ticks have been submitted by concerned public and processed by FPMS on an annual basis. While issues of Lyme disease fall under the responsibility of Health Canada and the provincial health departments, NBDNR is aware that black-legged ticks carrying Lyme disease have been confirmed at multiple locations over multiple years throughout southern New Brunswick. In 2009, six three black-legged (deer) ticks (*I. scapularis*) were identified by FPMS and submitted to the Health Canada lab in Winnipeg for confirmation and testing. The 6 samples originated from 6 distinct locations in southern New Brunswick. Two of the black-legged ticks were found to be carrying the Lyme disease bacterium (one from a dog and one from a man who later contracted Lyme Disease).

SESSION III: EASTERN PEST MANAGEMENT ISSUES

Chair: ***Nelson Carter***
New Brunswick Department of Natural Resources

SEANCE III : LA REPRESSION DES RAVAGEURS DANS L'EST

Président : ***Nelson Carter***
Ministère des Ressources naturelles du Nouveau-Brunswick

ÉTAT DE SITUATION DES PRINCIPAUX RAVAGEURS FORESTIERS AU QUÉBEC EN 2010

Louis Morneau, Louise Innes, Pierre Therrien, Cédric Fournier et Julie Bouchard

Ministère des Ressources naturelles et de la Faune du Québec
Direction de l'environnement et de la protection des forêts
2700, rue Einstein, local D.2.370A
Québec, QC G1P 3W8

Résumé

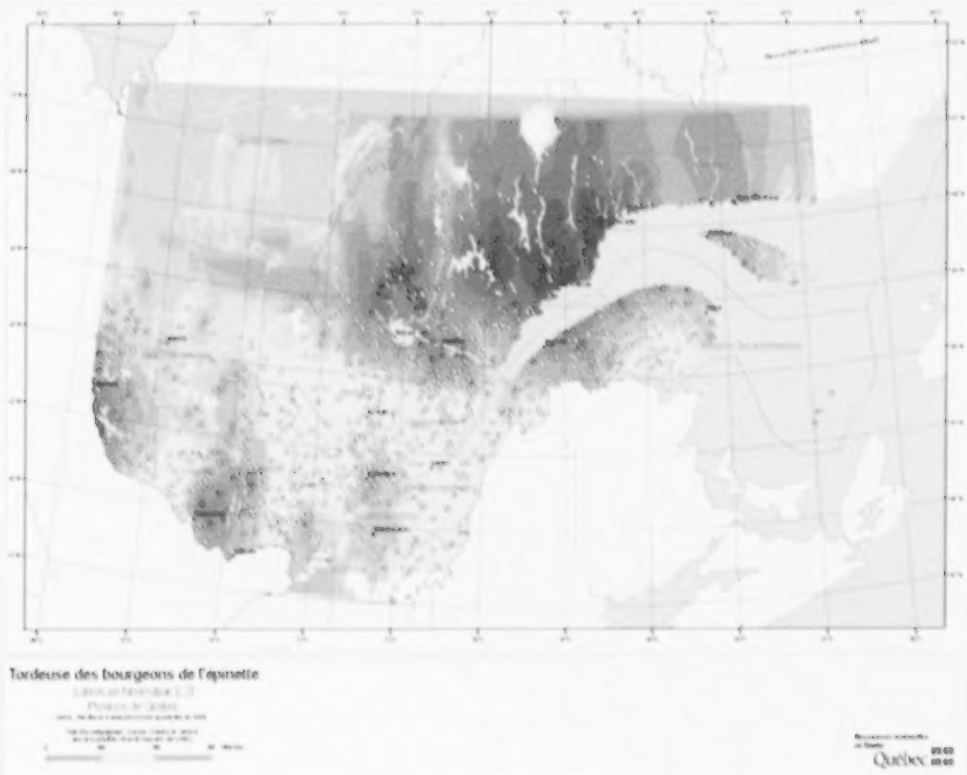
Le mandat de détection des insectes et maladies dans les forêts québécoises est assumé chaque année par la Direction de l'environnement et de la protection des forêts (DEPF) du ministère des Ressources naturelles et de la Faune (MRNF). Cette activité permet notamment d'identifier et de localiser les infestations d'insectes forestiers à caractère épidémique et de suivre leur évolution à l'aide de réseaux de surveillance provinciaux et de relevés aériens des dommages. La collecte des données sur les insectes et les maladies est effectuée par 18 techniciens régionaux. La DEPF planifie, coordonne et supervise les activités de relevés et fournit le soutien technique aux équipes régionales. Son laboratoire réalise les diagnostics entomologiques et pathologiques pour l'ensemble du Québec. La DEPF fournit également son expertise dans les programmes spéciaux d'évaluation de dommages ou de récupération de matière ligneuse mis en place à la suite d'importantes perturbations naturelles (chablis, verglas, feux, etc.). En 2010, les techniciens en protection des forêts ont visité 2 562 sites d'observation, dont 581 plantations de pins, d'épinettes, de mélèzes et de feuillus, et ont réalisé 8 347 rapports d'échantillonnage. De plus, le personnel de la DEPF a effectué des relevés aériens afin de détecter et de circonscrire les dégâts causés par la tordeuse des bourgeons de l'épinette, l'arpenteuse de la pruche, la livrée des forêts et d'autres insectes sur des superficies totalisant 105 406 km², ce qui a requis plus de 200 heures de vol. Enfin, 25 pépinières publiques et privées ont fait l'objet d'inspections phytosanitaires. Des lots totalisant quelque 191,5 millions de plants ont été examinés lors des inspections de certification et quelque 9,9 millions de plants ont fait l'objet d'inspections d'automne.

La **tordeuse des bourgeons de l'épinette** (TBE), *Choristoneura fumiferana*, demeure le principal ravageur des résineux dans la province. Les superficies défoliées par la TBE en 2010 totalisent 765 740 hectares (carte 1) comparativement à 321 146 hectares en 2009 et

133 603 hectares en 2008. L'épidémie a progressé principalement dans les régions de la Côte-Nord (532 342 ha), du Saguenay–Lac-Saint-Jean (156 797 ha), et de l'Abitibi-Témiscamingue (57 437 ha). Les infestations relevées dans les régions de la Mauricie (2 769 ha) et des Laurentides (149 ha) n'ont pas connu d'expansion significative par rapport à 2009 alors qu'une baisse des superficies touchées a été observée dans l'Outaouais (16 246 hectares). En 2010, un programme de pulvérisations aériennes contre la TBE a été mis en œuvre pour une deuxième année consécutive dans la région de la Côte-Nord et pour une première année dans la région du Saguenay–Lac-Saint-Jean en 2010. La Société de protection des forêts contre les insectes et maladies (SOPFIM) est l'organisme mandaté par la ministre pour élaborer et réaliser le plan d'intervention annuel. Des arrosages d'un insecticide biologique, le *Bacillus thuringiensis* var. *kurstaki* (*Btk*), ont été réalisées du 26 mai au 13 juin sur une superficie totale de 55 730 hectares.

Le site Internet de la SOPFIM (www.sopfim.qc.ca) contient de plus amples renseignements sur les résultats du plan d'intervention 2010.

Carte 1. Défoliations causées par la tordeuse des bourgeons de l'épinette au Québec en 2010



Carte 2. Inventaire de prévision (L2) de la tordeuse des bourgeons de l'épinette au Québec en 2010

En 2010, 1 360 stations d'observation ont été visitées pour le dénombrement des larves de TBE au stade L2 (carte 2). De ce nombre, 462, situées dans les principaux foyers d'infestation des régions de la Côte-Nord et du Saguenay–Lac-Saint-Jean, ont été inventoriées par la SOPFIM. Les résultats des inventaires de l'automne 2010 permettent d'anticiper les tendances évolutives de l'épidémie de la TBE dans plusieurs régions du Québec en 2011. Il est à prévoir que les infestations sur la Côte-Nord et dans la région du Saguenay–Lac-Saint-Jean vont persister et pourraient s'étendre aux secteurs avoisinants. Une hausse de population observée dans le sud-ouest de l'île d'Anticosti fera l'objet d'un suivi en 2011 afin de détecter l'activité de l'insecte. En Outaouais, les résultats suggèrent que l'infestation sera encore active en 2011 dans les secteurs touchés depuis plusieurs années de la vallée de la rivière Gatineau. En Abitibi-Témiscamingue, les dommages se maintiendront probablement autour du secteur touché. En Mauricie, les foyers d'infestation répertoriés seront toujours actifs. Dans les régions du Bas-Saint-Laurent et de la Gaspésie–Îles-de-la-Madeleine, une hausse des niveaux de populations dans certains sites le long

du fleuve Saint-Laurent et dans la vallée de la Matapédia pourrait se traduire par l'apparition de défoliations en 2011.

Les foyers d'infestation de l'**arpenteuse de la pruche**, *Lambdina f. fiscellaria*, détectés en 2009 sont toujours actifs cette année (carte 3). Ils totalisent 12 936 hectares dont la majorité sont de niveau grave. De plus, des dommages par l'arpenteuse ont été observés sur une trentaine d'hectares des îles de Mingan. Un survol aérien a permis de confirmer et de caractériser l'étendue et l'intensité de ces dommages. Ailleurs au Québec, les relevés des œufs, utilisés pour établir les prévisions sur l'évolution des populations de ce ravageur pour 2011, ne laissent pas entrevoir d'activité importante de l'insecte dans les endroits échantillonnés. Ce constat se reflète également dans les captures de papillons qui atteignent généralement des niveaux comparables à ceux de 2009.

Carte 3. Défoliations causées par l'arpenteuse de la pruche au Québec en 2010

Aucune défoliation par la **tordeuse du pin gris**, *Choristoneura p. pinus*, n'a été détectée par le relevé aérien des dommages en 2010. Les relevés terrestres confirment encore la présence locale de l'insecte dans un site au Saguenay–Lac-Saint-Jean et ce, depuis 2004. Les captures de papillons dans le réseau de pièges à phéromones sont faibles en 2010 et correspondent aux inventaires de

prévision qui ne laissent pas entrevoir d'augmentation importante de cette tordeuse pour 2011. Des défoliations par la **livrée des forêts**, *Malacosoma disstria*, ont été notées en 2010 dans les régions de l'Outaouais (7 928 ha), de Lanaudière (857 ha) et des Laurentides (106 ha).

Les derniers foyers actifs en 2009 de l'épidémie de la **tordeuse du tremble**, *Choristoneura conflictana*, dans les régions du Bas-Saint-Laurent, de la Capitale-Nationale, de la Chaudière-Appalaches, de la Mauricie et du Centre-du-Québec se sont complètement résorbés en 2010.

La présence de dommages causés par le **papillon satiné**, *Leucoma salicis*, continue d'être observée dans certaines régions du Québec en 2010. Des défoliations par l'insecte ont été notées dans les régions de la Gaspésie–Îles-de-la-Madeleine, de la Côte-Nord, du Bas-Saint-Laurent, de l'Outaouais, de la Capitale-Nationale et de la Chaudière-Appalaches. Le relevé aérien a permis d'évaluer les superficies défoliées par l'insecte dans certaines régions, sans toutefois couvrir l'ensemble de la province. Les plus importantes superficies touchées sont situées dans la région de la Côte-Nord (8 220 ha) et celle de la Gaspésie–Îles-de-la-Madeleine (2 488 ha).

Des **maladies du feuillage et des pousses** ont été rapportées dans plusieurs secteurs de la province. Dès le mois de mai, un jaunissement des aiguilles de l'année précédente était visible sur les pins blancs de différentes grosseurs. Les aiguilles du bas des arbres semblaient être plus affectées que celles du sommet. Cette décoloration fut suivie du brunissement puis de la chute prématurée de ces aiguilles. Deux champignons, la brûlure en bandes brunes, *Mycosphaerella dearnessii*, et le rouge des aiguilles, *Canavirgella banfieldii*, sont associés à ces dommages. La brûlure en bandes brunes a été rapportée dans les régions de la Gaspésie–Îles-de-la-Madeleine, de la Mauricie, des Laurentides et de l'Outaouais tandis que le rouge des aiguilles l'était dans celles du Saguenay–Lac-Saint-Jean, de la Capitale-Nationale, de Lanaudière, de l'Outaouais et de l'Abitibi-Témiscamingue. L'apparition de ces agents pathogènes a été favorisée par des conditions climatiques particulières survenues lors de la saison de croissance 2009 (pluies fréquentes et basses températures) et au printemps 2010 (printemps particulièrement hâtif et chaud accompagné de chutes drastiques de la température occasionnant des gelures).

On mentionne également la présence d'attaques par des champignons responsables de maladies qui ont causé des dégâts importants, telles les brûlures des pousses sur des résineux causées par *Sirococcus conigenus*, *Diplodia pinea* et *Delphinella abietis*. Cette dernière maladie a endommagé les nouvelles pousses du sapin baumier dès le mois de juin, dans plusieurs forêts situées dans les

régions du Bas-Saint-Laurent, de la Gaspésie–Îles-de-la-Madeleine et de la Côte-Nord.

Les températures chaudes du printemps ont favorisé le débourrement hâtif de plusieurs essences forestières. Ainsi, plusieurs cas de **gelure printanière** causée par des nuits très froides ont été rapportés partout en province. Les dégâts ont été les plus importants sur l'érable à sucre dans les régions de la Capitale-Nationale, de la Chaudière-Appalaches, de la Mauricie, de l'Estrie, de Montréal et de l'Outaouais, et sur l'épinette noire dans les régions du Saguenay–Lac-Saint-Jean, de l'Outaouais, de l'Abitibi-Témiscamingue et de la Côte-Nord.

La **maladie du rond** s'installe dans des plantations de pins où l'on a pratiqué des éclaircies ou des coupes une dizaine d'années auparavant. Ce pourridié nommé *Heterobasidion irregulare* entraîne la mort d'arbres à partir d'un point central, habituellement une souche contaminée. C'est en Outaouais que l'on a détecté la maladie pour la première fois au Québec, en 1989. Depuis ce temps, elle a été rapportée à plusieurs endroits dans les régions des Laurentides, du Centre-du-Québec et de Lanaudière. En 2010, une plantation de pins s'ajoute à la liste des sites affectés. Celle-ci est située près de Stukeley-Sud dans la région de l'Estrie (carte 4). C'est la première mention de la maladie dans cette région. La maladie a entraîné la mort de plusieurs pins rouges.

Maladie du rond
Heterobasidion irregulare (Fr. : Fr.) Bref.
Maladie du rond de 1989 à 2009
Maladie du rond en 2010
Région administrative
Québec

Carte 4. Historique de la présence de la maladie du rond au Québec entre 1989 et 2010

Abstracts / Résumés

L'Agence canadienne d'inspection des aliments a confirmé la présence de l'**agrile du frêne**, *Agrilus planipennis*, dans la région de la Montérégie, au Québec, en juin 2008. Un partenariat entre les gouvernements fédéral et provincial ainsi que la municipalité de Carignan a permis la réalisation d'une opération d'abattage de 210 frênes infestés par l'agrile du frêne à Carignan en mars 2010. L'objectif visé était de réduire la population d'agrile du frêne, de freiner la dispersion naturelle de l'insecte et de contribuer à la réalisation d'activités de recherche sur la lutte biologique contre ce ravageur exotique. À l'automne, une visite par le personnel du MRNF et de l'ACIA de la zone infestée ayant fait l'objet de la coupe phytosanitaire de mars 2010 a permis d'identifier 300 nouveaux arbres infestés ou potentiellement infestés par l'agrile du frêne.

Bilans du relevé des insectes et maladies des arbres du Québec:
http://www.mrnf.gouv.qc.ca/forets/fimaq/insectes/fimaq-insectes-portrait.jsp

Cartes des relevés aériens de défoliation:
http://www.mrnf.gouv.qc.ca/forets/fimaq/insectes/fimaq-insectes-portrait-superficies.jsp

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Quebec pest reports:
http://www.mrnf.gouv.qc.ca/forets/fimaq/insectes/fimaq-insectes-portrait.jsp

Aerial survey maps:
http://www.mrnf.gouv.qc.ca/forets/fimaq/insectes/fimaq-insectes-portrait-superficies.jsp

Major Forest Disturbances Affecting Ontario's Forests – 2010

Taylor Scarr* and *Krista L. Ryall

Ontario Ministry of Natural Resources
70 Foster Drive, Suite 400
Sault Ste. Marie, ON P6A 6V5

Abstract

The forest health monitoring program in Ontario continued to evolve in 2010. The Ontario of Natural Resources (OMNR) delivered the field monitoring portion of the program. The ten OMNR forest health technicians (Figure 1) conducted aerial and ground surveys to detect, identify, quantify, and report on the major forest insects, diseases, and abiotic (weather) factors affecting the health of Ontario's forests. The Canadian Forest Service provided insect identification and scientific advice, as well as conducting research projects in partnership with OMNR related to forest health. Disease identification was done by OMNR's Ontario Forest Research Institute.

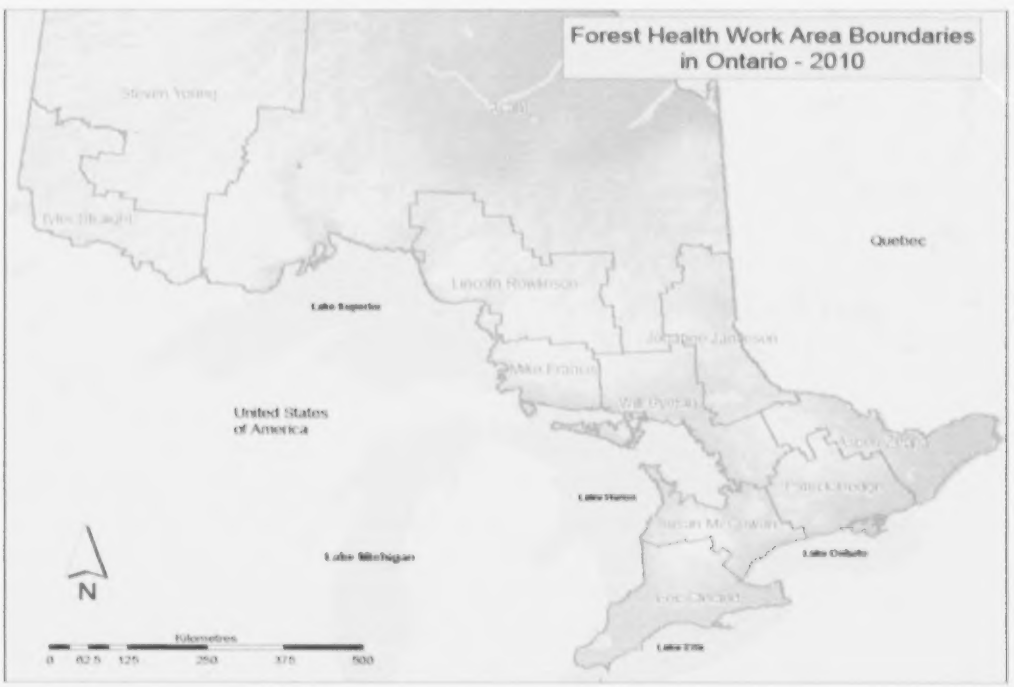


Figure 1. Forest health technicians and assigned work areas for Ontario, 2010.

While 2010 was a relatively quite year for major forest disturbances, there were some significant events worth noting. Jack pine budworm (*Choristoneura pinus pinus*) has been undergoing an outbreak since 2004. In 2010, populations continued to decline, except for pockets of defoliation scattered in the districts of Red Lake, Sioux Lookout, Kenora, Timmins, Sudbury, Parry Sound, and Pembroke, and in Algonquin Park (Figure 2). This defoliation totalled 55,621 ha, most of which 44,968 ha was moderate-to-severe. This represents an approximately 75% reduction from the 205,701 ha of moderate-to-severe in 2009.

Figure 2. Areas within which jack pine budworm caused moderate to severe defoliation, 2010.

The jack pine budworm outbreak is now at a relatively low level, compared to the long term population trends for this insect (Figure 3). This outbreak is expected to continue to break up in 2011, with perhaps some localised pockets of defoliation.

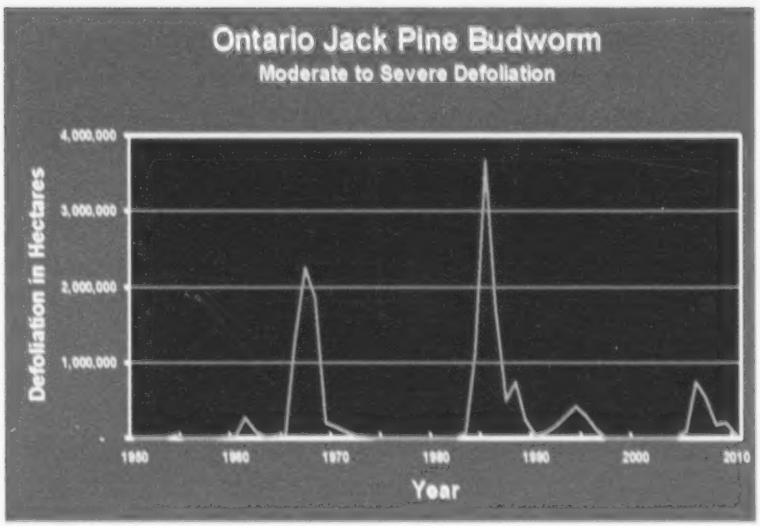


Figure 3. Jack pine budworm defoliation in Ontario, 1950-2010.

Spruce budworm *Choristoneura fumiferana* defoliation increased in 2010 to 412,320 ha (Figure 4), compared to 291,592 ha in 2009. This defoliation continued to be concentrated in the area between North Bay and Sudbury, plus in the city of Sault Ste. Marie. This increase could be at least partly attributed to the warmer drier weather of 2010 which made defoliation more visible and easier to map. While 2010 represents a 1/3 increase in the area defoliated, the current outbreak is still quite small relative to the previous outbreak (Figure 5).

Figure 4. Areas within which spruce pine budworm caused moderate to severe defoliation, 2010.

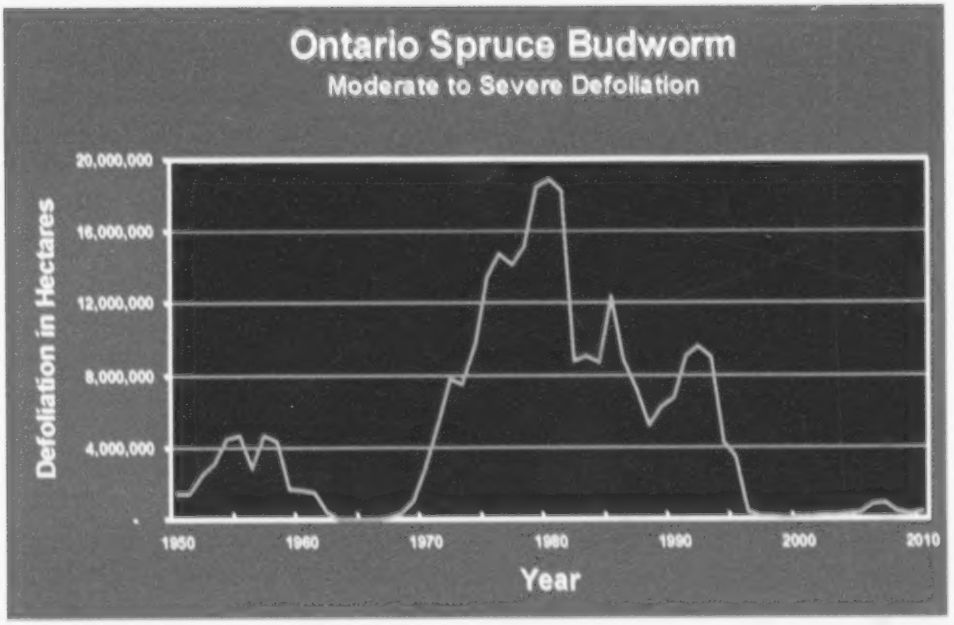


Figure 5. Spruce budworm defoliation in Ontario, 1950-2010.

Forest tent caterpillar *Malacosoma disstria* populations continued to increase in southern Ontario, causing 60,424 ha of moderate-to-severe defoliation (Figure 6) compared to 8,912 ha in 2009. Severe defoliation by this insect has not been recorded previously in this part of the province. Based on this insect's cyclical population (Figure 7), it appears that it is poised to begin a new outbreak in Ontario. In contrast, the gypsy moth *Lymantria dispar* remains at negligible levels throughout Ontario following two years of cool wet weather that favoured infection by the fungus *Entomophaga maimaiga*.

Figure 6. Areas within which forest tent caterpillar caused moderate to severe defoliation, 2010.

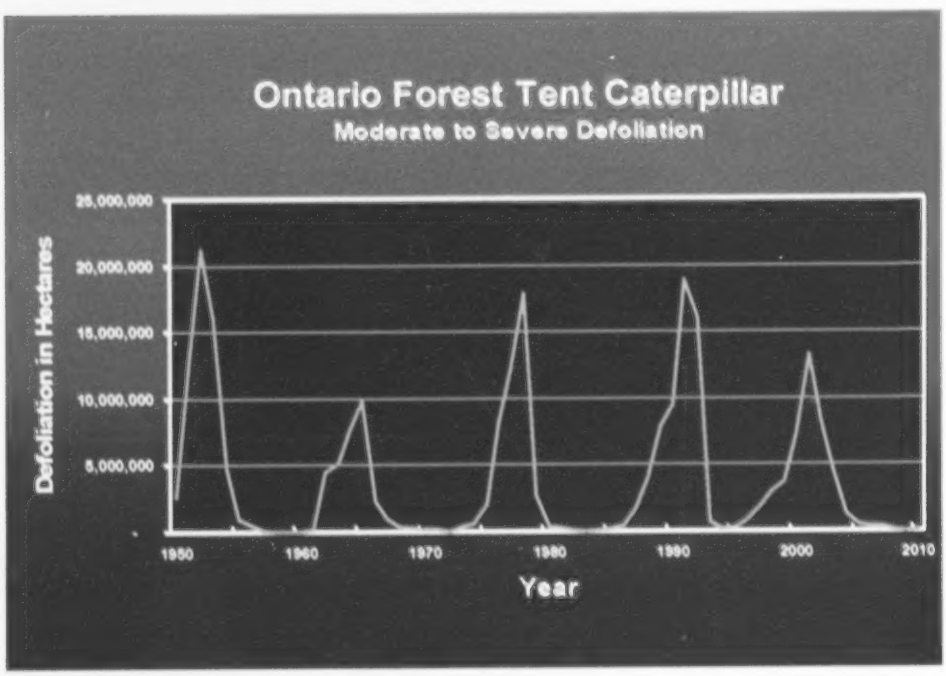


Figure 7. Forest tent caterpillar defoliation in Ontario, 1950–2010.

Several other insects caused localized defoliation or damage in various locations in the province, including fall cankerworm *Alsophila pometaria* (2,638 ha, Aylmer District), fall webworm *Hyphantria cunea* (12 ha, Kenora District), larch case bearer *Coleophora laricella* (1,720 ha, Parry Sound and Midhurst districts), white spotted sawyer beetle *Monochamus scutellatus* (825 ha, Sioux Lookout and Nipigon districts), pine false webworm *Acantholyda erythrocephala* (36 ha, Sault Ste. Marie and North Bay districts), and pink striped oakworm *Anisota virginiensis* (683 ha, Kenora District).

Large aspen tortix *Choristoneura conflictana* has been a perennial defoliator of aspen for several years. In 2010, scattered pockets of defoliation totalling 15,604 ha occurred in the northeast in Sault Ste. Marie, Chapleau, and Sudbury districts (Figure 8). This is a significant reduction from the 88,862 ha in the northeast in 2009.

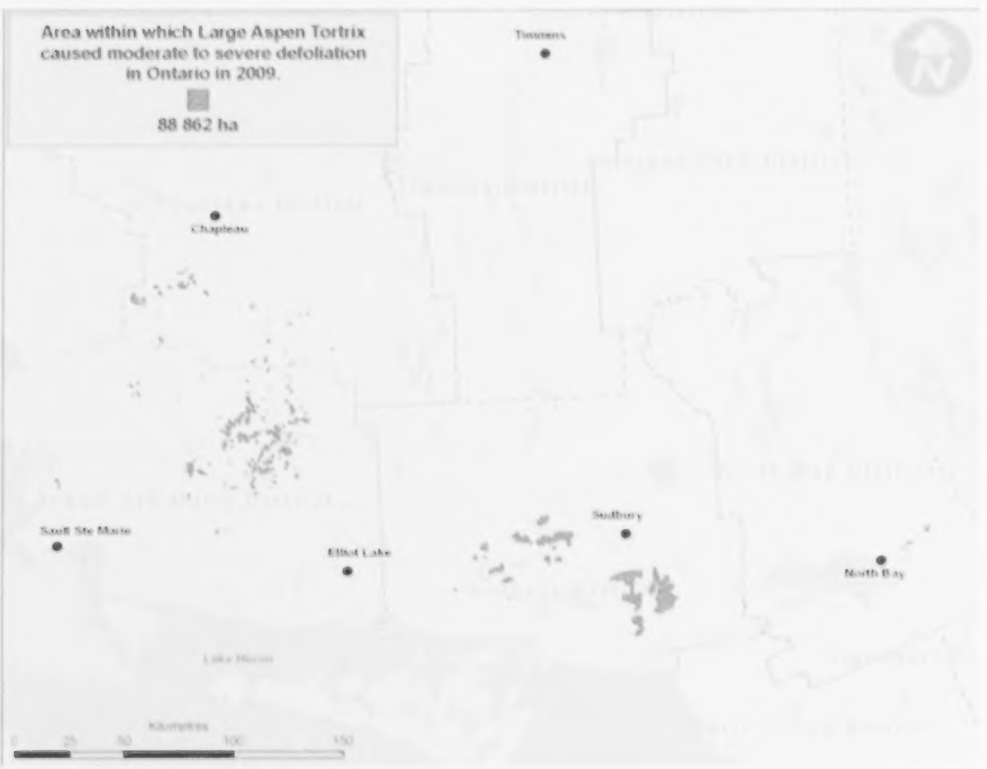


Figure 8. Areas within which large aspen tortrix caused moderate to severe defoliation, 2010.

Aerial surveys showed that emerald ash borer *Agrilus planipennis* continued to cause increasing tree mortality, reaching 35,261 ha of cumulative tree mortality in south western Ontario (Figure 9).

Figure 9. Areas of ash decline and mortality caused by emerald ash borer, 2010.

Tree foliar diseases were far less common in 2010, which was relatively warm and dry, compared to the cool wet weather of 2009. A significant expansion to 15,948,648 ha in the area of aspen decline in north western Ontario (Figure 10) occurred in 2010, compared to 3,803,807 ha in 2009. Much of this increase could be attributed to increased attention to this phenomenon after it was mapped in 2009. Out of the total area affected in 2010, only 3,172,312 ha showed severe decline, while 12,776,336 ha had light decline. While the cause of this decline (thin crowns, small leaves, light coloured leaves, and some tree mortality) is unknown, monitoring plots are being established to investigate this event further.

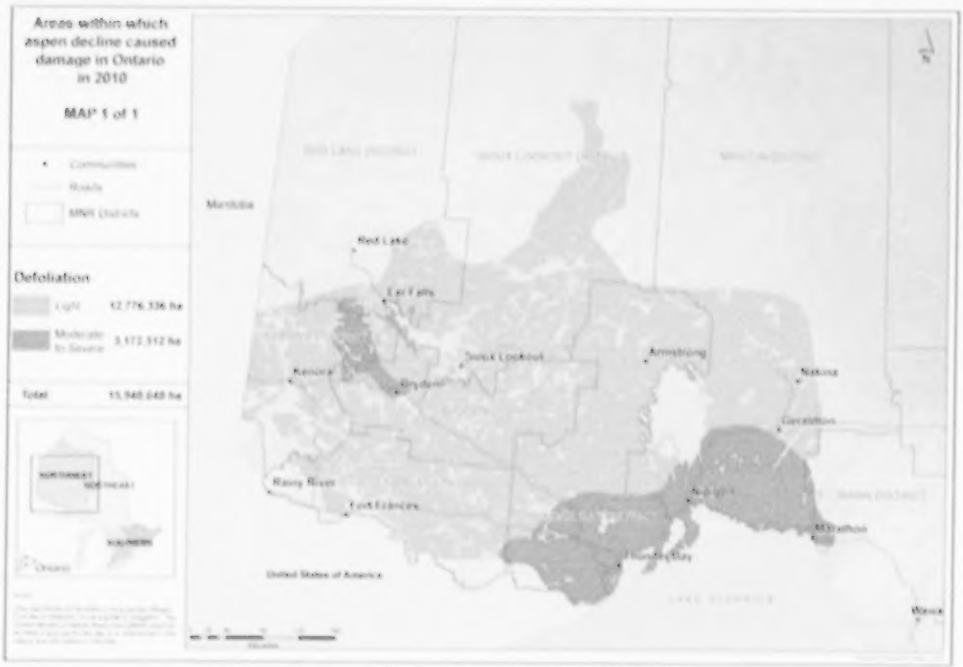


Figure 10. Areas within which aspen decline and mortality occurred in Ontario, 2010.

An extensive area of leaf browning occurred in late August and September on white birch throughout much of north western Ontario and extending in Wawa and Sault Ste. Marie districts. In some areas it was caused by infection by *Septoria* leaf blight, or by birch leaf skeletonizer *Buccalatrix canadensisella*, or by both organisms occurring in the same area on the same leaves. The area was too extensive to aerially map, and occurred wherever birch trees grew in much of Northwest Region.

In early summer an unusual event of extensive leaf drop occurred over an area of 694,863 ha mostly concentrated in the maple forests in the districts of Parry Sound, Bancroft, Midhurst, and Peterborough (Figure 11). Other hardwoods including basswood, elm, and poplar trees were also affected. The likely cause appears to be a combination of a very early spring and very early bud burst, followed by frost and then very cold temperatures, followed by very high temperatures and drought conditions. The trees responded to these stresses by dropping their leaves. Trees in valleys and on hilt tops were affected.

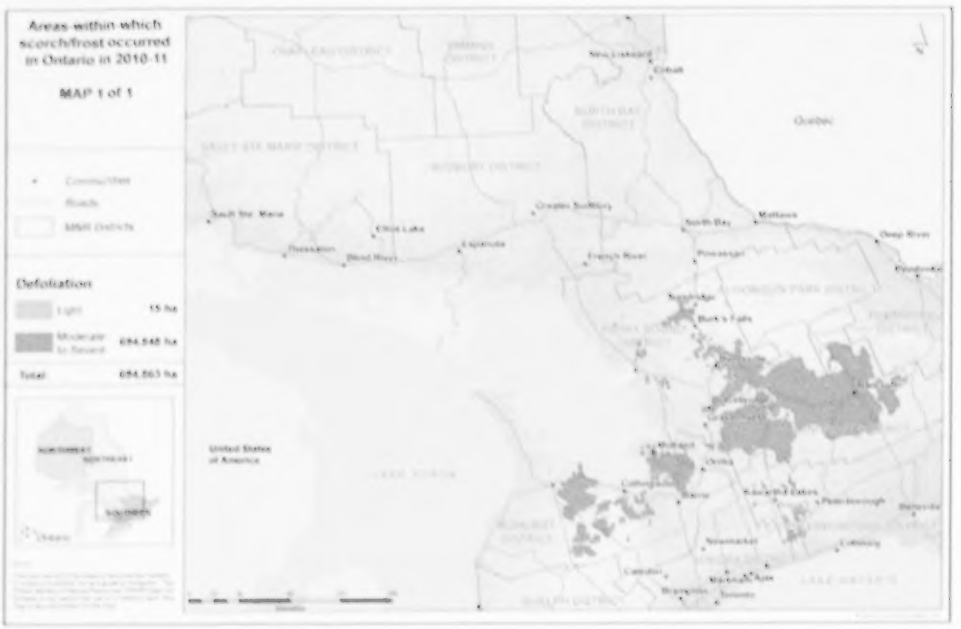


Figure 11. Areas within which scorch and frost damage occurred on hardwood trees in Ontario, 2010.

Acknowledgements

We thank the forest health technicians (Figure 1) for all their work in the aerial and ground surveys that were used to compile this report. The 2010 field program was coordinated by Dan Rowlinson. Insect identification was done by Kathryn Nystrom and Isabelle Ochoa. Disease identification was done by Sylvia Greifenhagen. The maps were produced by Gilbert Racine. Ron Fournier and Don Higgs also assisted with compiling the maps. Ron Fournier provided the historical defoliation data. The forest health technicians were assisted by Steen Anderson, forestry intern in Thunder Bay, and by summer experience student Stephanie Seymour.

SESSION IV: NORTH OF 60 REPORT

SEANCE IV : AU NORD DU 60e PARALLELE

NORTHWEST TERRITORIES REPORT – 2010

Mike Gravel

Government of Northwest Territories, Environment & Natural Resources
P.O. Box 4354
#173 Hay River Dene Reserve
Hay River, NT X0E 1G3

Abstract

The Government of the Northwest Territories' Department of Environment and Natural Resources (ENR) delivers forest health monitoring across the NWT. Given that the territory is greater than 100 million hectares, only areas identified as high risk are surveyed (major rivers and water ways) (Fig. 1). Overall, 2010 was a slow year with respect to insect infestation, but several species are on the rise.

Figure 1. Approximate flight lines for aerial forest health surveys conducted in 2010, the area flown is greater than 5,000 kilometres.

Spruce budworm (*Choristoneura fumiferana*)

Spruce budworm is the most serious forest insect pest in the NWT; Spruce budworm populations crashed following 2002 and have remained at low numbers in the years since. The total area affected by spruce budworm in 2010 was approximately 84,380 hectares (ha), a 25% increase from 2009.

Small populations of spruce budworm have remained in the Slave River area and a new area has been detected along the north arm of Great Slave Lake (Fig. 2). The majority of NWT infestations however are occurring in the Sahtu Region (Norman Wells). A recent find of spruce budworm along the Arctic Red River is the farthest west we have seen the insect cause damage, and it has spread north of the Arctic Circle along the Mackenzie River (Fig. 3).

Figure 2. Spruce Budworm defoliation along the Slave River and north arm of Great Slave Lake.

Figure 3. Spruce Budworm defoliation along the Mackenzie River and Arctic Red River (western most defoliation). Note the area above the Arctic Circle.

Aspen Serpentine Leafminer *(Phyllocnistis populiella)*

Aspen Serpentine Leafminer is common in the NWT's forest, but current infestations are very high and are spread across southern NWT. In many cases, monitoring this insect at this time is more about where the Aspen Serpentine Leafminer is not found rather than where it is found, it is that widespread in aspen forests. There was considerable severe aspen defoliation caused by Aspen Serpentine Leafminer across the southern NWT (Fig. 4) affecting 292,446 ha.

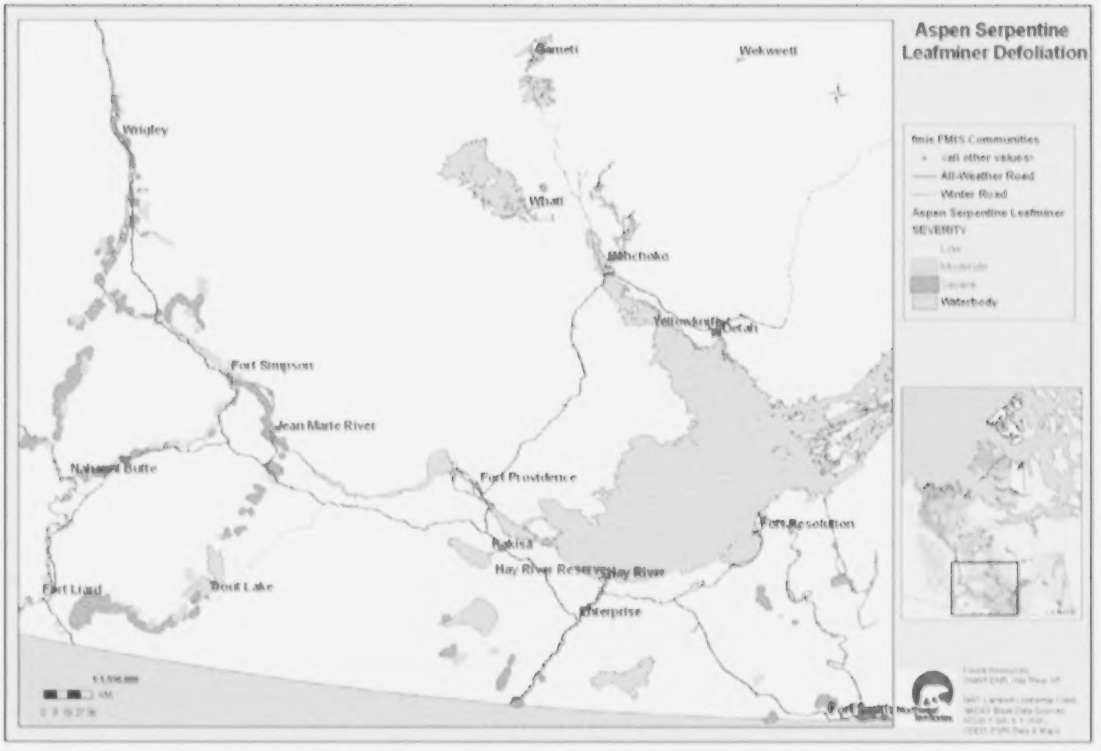


Figure 4. Severe defoliation in aspen caused by Aspen Serpentine Leafminer.

Willow Leaf Blotch Miner *(Micrurapteryx salicifoliella)*

The Willow Leaf Blotch Miner was widely noticeable along the highways in southern NWT. The Willow Leaf Blotch Miner was seen as far north as Wrigley.

Mountain Pine Beetle (*Dendroctonus ponderosae*)

No incidents or signs of Mountain Pine Beetle have been detected in the NWT.

SESSION V: UNITED STATES REPORT

SEANCE V : RAPPORT DES ÉTATS-UNIS

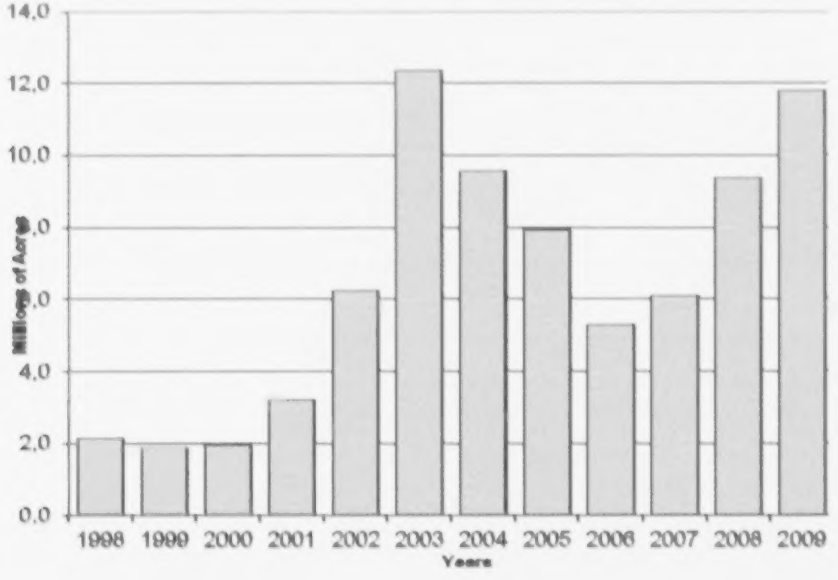
MAJOR INSECTS AND DISEASES IN THE UNITED STATES – 2010

Gary Man

USDA Forest Service, Forest Health Protection
1601 North Kent Street – 7th floor
Arlington, VA 20009, USA

Abstract

The United States is fortunate to possess a rich and abundant forest resource, ranking fifth largest in land cover among all countries. Today, the United States approximately 750 million acres classified as forest land continue to provide a wide array of services and commodities such as; timber and other forest products, recreation, wildlife, clean water, and carbon sequestration. Healthy forests, regardless of ownership, are important to providing these goods and services, on a sustainable basis. One aspect of maintaining and even enhancing a healthy forest is to protect and restore forests from native and non-native insects and diseases, which can cause significant damage. Surveys describing the forest insect and disease conditions are important tools to help prioritize actions by federal agencies, states, and other stakeholders. As with most biological systems, the overall mortality that insects and diseases cause varies from year to year and pest to pest. The following chart illustrates how mortality has varied over the past 12 years.



In 2009, nearly 11.8 million acres of mortality caused by insects and diseases were reported nationally, a 2.8 million-acre increase from 2008, when 9.0 million acres of mortality were reported. Nearly 75 percent of the mortality was caused by one pest, the mountain pine beetle, a native insect found in western U.S. forests. Although only mortality is represented in the chart, defoliation can have significant effects on our forests. The western spruce budworm caused more than 5.1 million acres of defoliation damage in 2009. Reports of European gypsy moth defoliation were reduced by over 70 percent from last year, but still defoliated over 450,000 acres.

Southern pine beetle mortality remains at low levels where only 1440 acres were recorded. The low levels are attributed in part to an active southern pine beetle prevention program where over 100,000 acres are treated every year.

Other pests that continue to impact both rural and urban forests include the emerald ash borer, hemlock wooly adelgid, Asian longhorn beetle, sudden oak death, and laurel wilt. Federal, State, and local agencies continue to survey for these pests and respond as appropriate.

A new pest, the thousand canker disease, which is caused by a twig beetle, *Geosmithia morbida* and a new disease, *Pityophthprus juglandis* has been reported killing black walnut trees in 9 states. Efforts are underway to more clearly delineate specific affected areas and start to determine appropriate control and management actions.

SESSION VI: FOREST PATHOLOGY

Chair: ***Lise Caron***

Natural Resources Canada, Canadian Forest Service

SEANCE VI : PATHOLOGIE FORESTIERE

Présidente : ***Lise Caron***

Ressources naturelles Canada, Service canadien des forêts

EARLY WARNING SYSTEM AGAINST EMERGING DISEASES

Jean A. Bérubé

Natural Resources Canada, Canadian Forest Service, Laurentian Forestry Centre
1055 du P.E.P.S.
P.O. Box 10380, Stn. Sainte-Foy
Québec, QC G1V 4C7

Abstract

An early warning system based on a random sampling of asymptomatic live plant material arriving in Canada is used to detect alien fungal pests. Forty-six sample lots collected by Canadian Food Inspection Agency (CFIA) inspectors from the province of Quebec were analyzed by cloning the fungal ribosomal ITS present in the plant tissues. We obtained 101 fungal species associated with 36 different host plants from the USA, France, the Netherlands and Thailand. Six fungal species found in this study could have a low to moderate potential impact and 11 could have a low potential impact for Canadian forests. Another 14 species could not be assessed given the limited scientific information available. In all cases, the potential impact evaluations of these 31 species originate from the fact that these species are new to science and/or belong to genera and families where pathogenic species are common. The alien fungal introductions with a potential to affect Canadian forests were found at a significant frequency (12.4%) and were present in the large majority of the sample lot sent by CFIA. The 70 other species found in this study were non pathogenic fungi, weak to moderately virulent, common and cosmopolitan species, or virulent species found on tropical hosts only.

Résumé

Un système d'alerte rapide fondé sur un échantillonnage au hasard de matériel végétal vivant asymptomatique entrant au Canada est utilisé pour détecter les maladies fongiques exotiques. Quarante six lots d'échantillons prélevés par des inspecteurs québécois de l'Agence canadienne d'inspection des aliments (ACIA) ont été analysés au moyen du clonage de l'ITS ribosomique des champignons présents dans les tissus végétaux. Nous avons obtenu 101 espèces fongiques associées à 36 plantes hôtes différentes des États Unis, de France, des Pays Bas et de Thaïlande. Six espèces fongiques trouvées dans le cadre de cette étude pourraient avoir une incidence potentielle faible à modéré, et onze pourraient avoir une incidence potentielle faible sur les

forêts canadiennes. Quatorze autres espèces n'ont pu être évaluées en raison du manque d'information scientifique disponible.

Dans tous les cas, les évaluations d'incidence potentielle de ces 31 espèces venaient du fait que ces dernières étaient jusque-là inconnues de la science ou qu'elles appartenaient à des genres ou à des familles où les espèces pathogènes sont communes. L'occurrence des maladies fongiques exotiques introduites pouvant affecter les forêts canadiennes s'est avérée significative (12,4 %); ces maladies étaient aussi présentes dans la grande majorité des lots d'échantillons envoyés par l'ACIA. Les 70 autres espèces trouvées dans le cadre de cette étude étaient des champignons non pathogènes, de virulence faible à modérée, d'espèces communes et cosmopolites, ou encore des espèces virulentes trouvées sur des hôtes tropicaux seulement.

PHYTOPHTHORA RAMORUM (SUDDEN OAK DEATH) – RECENT STUDIES IN CANADA

***Simon Shamoun*[1] *and Danny Rioux*[2]**

[1] *Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre*
506 West Burnside Road
Victoria, BC V8Z 1M5

[2] *Natural Resources Canada, Canadian Forest Service, Laurentian Forestry Centre*
1055 du P.E.P.S.
P.O. Box 10380, Stn. Sainte-Foy
Québec, QC G1V 4C7

Abstract

Phytophthora ramorum (Pr) is an alien invasive pathogen that causes diseases known as sudden oak death (SOD) (= ramorum bleeding canker), ramorum leaf blight or ramorum shoot dieback. This pathogen can infect more than 120 hosts, several of which being present in Canadian forested and urban areas. SOD attracted attention of the general public around 1995 when thousands of tanoak and oak trees were killed on private and public lands in California. The disease was also reported later in the wild in Oregon as well as in several nurseries throughout the US. In Canada, Pr was introduced a few times in nurseries of British Columbia but the pathogen is not considered established yet. Recent researches at PFC and LFC were mainly carried out in order to develop better mitigation measures or to help assess the risk this pathogen represents to Canada. Our presentation will summarize results about: 1) the development of PCR-RFLP molecular markers to identify the three Pr lineages; 2) the efficacy of commercial biocontrol products and fungicides against Pr; 3) the assessment of the aggressiveness among isolates and lineages of Pr; 4) the evaluation of susceptibility to Pr of some forest tree species common in eastern Canada; and 5) the research of putative resistance mechanisms in trees to this pathogen.

Résumé

Le *Phytophthora ramorum* (Pr) est un pathogène exotique envahissant à l'origine de la maladie appelée l'encre des chênes rouges. Il peut infecter plus de 120 hôtes différents, dont plusieurs sont présents dans les régions urbaines et forestières du Canada. L'encre des chênes rouges a retenu l'attention du grand public vers 1995, année où elle a entraîné la mort de milliers de

lithocarpes et de chênes sur des terres privées et publiques de la Californie. La maladie a par la suite été signalée en milieu naturel en Oregon et dans plusieurs pépinières un peu partout aux États-Unis. Au Canada, le pathogène à l'origine de la maladie a été introduit à quelques reprises dans des pépinières de la Colombie-Britannique, mais n'y est pas jugé encore établi. Les travaux de recherche récents menés au CFP et au CFL visaient principalement à mettre au point de meilleures mesures d'atténuation et à évaluer le risque que ce pathogène représente pour le Canada. Notre présentation résumera les résultats obtenus dans les domaines suivant : 1) la mise au point de marqueurs moléculaires de type PCR-RFLP pour identifier les trois souches du pathogène; 2) l'efficacité des produits antiparasitaires commerciaux et des fongicides contre l'encre des chênes rouges; 3) l'évaluation de l'agressivité d'isolats et des souches du pathogène; 4) l'évaluation de la sensibilité à l'encre des chênes rouges de certaines essences forestières communes dans l'est du Canada; et 5) la recherche de mécanismes de résistance présumée à ce pathogène chez les arbres.

White Pine Browning in Eastern Canada and Evidence of the Presence of Fungal Pathogens

Gaston Laflamme[1], Chantal Côté[1], and Louise Innes[2]

[1] *Natural Resources Canada, Canadian Forest Service, Laurentian Forestry Centre*
1055 du P.E.P.S.
P.O. Box 10380, Stn. Sainte-Foy
Québec, QC G1V 4C7

[2] *Ministère des Ressources naturelles et de la Faune du Québec*
Direction de l'environnement et de la protection des forêts
2700, rue Einstein
Québec, QC G1P 3W8

Abstract

In 2009, browning of white pine (*Pinus strobus*) needles was reported from several regions in three Canadian provinces: New Brunswick, Quebec and Ontario. Several causal agents were presented as hypotheses: drought, pollution as well as several needle diseases. In the summer of 2010, samples of white pine needles were collected in areas where symptoms had been seen the previous year. Sampling was done by the three provincial agencies. In addition, one white pine was sampled every month from September 2009 to August 2010 in Quebec City. At least six fungal species were observed or isolated from these needles. A few were parasites, some were endophytic fungi and obtained from diseased needles collected in June; some were secondary fungi like *Hendersonnia pinicola*. The most common pathogen found was *Canavirgella banfieldii* which is very similar to *Lophophacidium dooksii*. The browning of the current year needles is visible from late July, early August. The discoloration affects only the distal portion of the needles and not all of the needles in a fascicule are infected. Also, the lower section of trees seems to be more diseased than the top. Some white pines are resistant to this disease. The teleomorph of *C. bandfieldii* appears on previous year needles in early summer. A second pathogen, *Mycosphaerella dearnessii*, has also been observed in June on previous year needles: the entire infected needle turns yellow and red bands are visible near the infection point. These needles drop a couple of weeks following their change of color. Both pathogens were often collected on the same tree. All these fungi are being sequenced and the results should clarify the synonymy of some fungal species and their classification at the family level.

Résumé

En 2009, le brunissement des aiguilles du pin blanc (*Pinus strobus*) était rapporté dans des régions de trois provinces: le Nouveau Brunswick, le Québec et l'Ontario. Plusieurs hypothèses furent avancées comme la sécheresse, la pollution ainsi que des maladies d'aiguilles. À l'été 2010, des aiguilles ont été échantillonnées sur des pins montrant des symptômes en 2009. Ce travail a été fait par le personnel des trois provinces concernées. De plus des pousses d'un pin blanc furent récoltées chaque mois de septembre 2009 à août 2010 à Québec. Au moins six espèces fongiques furent observées ou isolées des aiguilles. Certaines étaient des champignons pathogènes; des espèces endophytes furent obtenues des aiguilles récoltées en juin, de même que des champignons secondaires comme *Hendersonnia pinicola*. Le parasite le plus fréquent était *Canavirgella banfieldii* lequel présente des symptômes très semblables à *Lophophacidium dooksii*. Le brunissement des aiguilles de l'année courante est visible de fin juillet à la mi-août. La coloration n'affecte que la partie distale de l'aiguille et toutes les aiguilles d'un fascicule ne sont pas nécessairement infectées. De plus, la base des cimes semble plus affectée que les sommets. Certains pins montrent de la résistance à la maladie. Les téléomorphes de *C. bandfieldii* apparaissent sur les aiguilles de l'année précédente en début d'été. Un second champignon pathogène *Mycosphaerella dearnessii*, a aussi été observé en juin; les aiguilles tournent complètement au jaune; des bandes rouges sont visibles au point d'infection. Ces aiguilles tombent dans les semaines suivant l'apparition de la coloration. Ces deux champignons pathogènes ont été récoltés sur le même arbre. Tous ces champignons seront séquencés et les résultats devraient clarifier la synonymie de deux espèces ainsi que de leur classification.

SESSION VII: PESTICIDE REGULATIONS, ALTERNATIVES, MINOR USE

Chair: ***Michael Irvine***
Ontario Ministry of Natural Resources

SEANCE VII : REGLEMENTS SUR LES PESTICIDES, SOLUTIONS POSSIBLES, USAGE LIMITE

Président : ***Michael Irvine***
Ministère des Richesses naturelles de l'Ontario

PMRA Update

Bonnie MacLeod

Health Canada
Pest Management Regulatory Agency
2720 Riverside Drive
Ottawa, ON K1A 0K9

NOT AVAILABLE

SESSION VIII: INVASIVE SPECIES AND PESTICIDE REGULATIONS

SEANCE VIII : ESPECES ENVAHISSANTES ET REGLEMENTATION SUR LES PESTICIDES

Pesticides for Invasive Species Management – a Provincial Perspective

Taylor Scarr

Ontario Ministry of Natural Resources
70 Foster Drive, Suite 400
Sault Ste. Marie, ON P6A 6V5

NOT AVAILABLE

SESSION IX: WESTERN PEST MANAGEMENT ISSUES

Chair: *Taylor Scarr*
Ontario Ministry of Natural Resources

SEANCE IX : LA REPRESSION DES RAVAGEURS DANS L'OUEST

Président : *Taylor Scarr*
Ministère des Richesses naturelles de l'Ontario

FOREST PESTS IN MANITOBA – 2010

Irene Pines

Forestry Branch, Manitoba Conservation
200 Saulteaux Crescent
P.O. Box 70
Winnipeg, MB R3J 3W3

Abstract

Spruce Budworm

In 2010 the spruce budworm, *Choristoneura fumiferana,* infestation continued in Manitoba. Moderate to severe defoliation occurred in the Northwest Region, Northeast Region, the Spruce Woods area in south western Manitoba and in Riding Mountain National Park. In 2010 spruce budworm defoliation polygons were roughly digitized directly into ESRI Arc View Shapefiles using Tablet PC's by the aerial observers during the detection flights. The mapped infestation was approximately 10,500 ha. The area of infestation was 5,024 ha in the Northwest Region (Figure 1), an estimated 45 ha in Paint Lake Provincial Park and 5,425 ha in Spruce Woods area. No defoliation was observed in the Eastern Region. The area of defoliation in Riding Mountain National Park was approximated at 30,000 ha in 2010.

Figure 1. Spruce Budworm 2010 Defoliation Northwestern Manitoba (5,024 ha)

Based on the 2009 defoliation predictions derived from the fall egg mass surveys and hazard ratings for tree condition, an operational budworm suppression program was implemented in 2010 within the Spruce Woods Provincial Park in southwestern Manitoba. The biosynthetic insecticide, Mimic® 240 LV (tebufenozide) was applied aerially to a land base of 6,275 ha and spray blocks received a single application of 70 grams a.i. of Mimic® per ha.

Each aerial spray aircraft was equipped with the Satloc AirStar M3 real time differential Global Positioning System (GPS) aerial navigation system. This system provided guidance over the treatment areas and provided pilots with feedback on their performance after each spray session. Second-by-second GPS and spray application data from each spray aircraft was imported into the Pesticide Application Information System. The use of this system has facilitated faster correction of spray application problems. A Cessna 182 aircraft was used for additional navigational support.

Weather monitoring stations from Environment Canada, Manitoba Agriculture, Food and Rural Initiatives and the provincial Fire Program were utilized in the 2010 spruce budworm management program. The weather components of temperature, relative humidity, wind speed, wind direction and precipitation are used in timing of application and deploying the spray aircraft.

The 2010 spray project was successful in spite of poor weather conditions and equipment malfunctions that delayed application for at least a week later than the targeted larval development stage. Another influencing factor was the early warm spring conditions which allowed for rapid development of spruce budworm from young larvae to pupae. The mean population reductions due to treatment was an estimated 55% (Table 1) as many of the larvae had pupated by post-spray and were not be included in the counts. Generally, light defoliation occurred within the treated blocks, while moderate defoliation occurred in the untreated controls.

Table 1. Spruce Budworm - Percent Reduction in Larval Numbers

Southwest Region	Pre Spray Larvae[a]	Post Spray Larvae[a]	Larval Mortality	Corrected Mortality
Treated	33	4	88%	55%
Untreated Controls	48	12	74%	N/A

Defoliation assessments and egg mass density surveys to predict 2011 defoliation were conducted throughout the province in August and September (Table 2).

Table 2. 2010 Spruce Budworm Defoliation and Predictions for 2011

Location	2010 Defoliation*	2010 Egg Mass/10 m^2	2011 Defoliation Prediction
Northeast	light to moderate	48	moderate
Northwest	light	22	light
Western	light	0	light
Riding Mt. Nat. Park	moderate	49	Moderate
Southwest	light	21	light
Interlake	light	7	light
Eastern	light	0	light

*Defoliation classes are as follows:

light — up to 35% defoliation of current shoots based on <40 egg masses per 10 m^2 of branch area

moderate — 35% to 70% defoliation of current shoots based on 40 to 185 egg masses per 10 m^2 of branch area

severe — greater than 70% defoliation of current shoots and possible feeding on old foliage based on >185 egg masses per 10 m^2 of branch area

Spruce budworm pheromone traps were placed at 33 locations throughout the province and traps/lures were provided to Riding Mountain National Park for 8 sites. Three MULTIPHER® insect traps containing spruce budworm pheromone (PVC lure containing 0.3% by weight of a 95:5 blend of (E)- and (Z)-11-tetradecenal) were placed 40 m apart at each plot location in either a straight or triangular configuration. Average moth captures per trap decreased in six of the seven regions with only a slight drop in moth captures for the Spruce Woods area in Southwestern Manitoba (Table 3).

Table 3. Spruce Budworm Pheromone Trapping

Location	2009 Moth Capture/Trap	2010 Moth Capture/Trap	% Change
Northwest Region	828	462	-44%
Northeast Region	947	567	-40%
Western Region	222	172	-22%
Southwest Region	2,265	2,118	-6%
Riding Mt. National Park	1,509	255	-76%
Interlake Region	376	156	-58%
Eastern Region	113	20	-82%

Dutch Elm Disease

Provincial Dutch elm disease (DED) sanitation crews removed 6,080 trees in 2009/10; 2,897 were within the Winnipeg DED buffer zone and 3,183 throughout the remainder of the province. The City of Winnipeg removed 5,596 elms and Brandon removed 201 elms. Total elm tree removals were 11,877.

In 2010, the number of Cost-Sharing Agreements was reduced from 37 to 31 communities. Provincial survey crews marked 6,705 elms for removal (3,384 within the Winnipeg buffer zone, 532 in the City of Brandon and 2,789 in and around the 30 cost-sharing agreement communities). In addition, 140 elm firewood piles were identified for removal. In the City of Winnipeg, 5,636 elms were marked for removal.

An increase in DED within several Cost-Sharing Agreement communities and the City of Winnipeg prompted a trial to test the feasibility of including trap trees in the provincial DED Integrated Management Program. Trap trees may be effective in reducing the elm bark beetle population in a localized area. Ten elms were selected in one community and a herbicide was applied by axe frill technique in September 2010. Assessments will be conducted on application methodology, onset of tree mortality and attractiveness to elm bark beetles. Destructive sampling of these treated elms is planned for July 2011.

In 1982, Manitoba Conservation began monitoring for presence of the invasive forest pest, the smaller European elm bark beetle (*Scolytus multistriatus*) which is another vector of Dutch elm disease. Pheromone traps were situated at several locations throughout southern Manitoba and

until 2006 only eight specimens of *S. multistriatus* had been captured. In 2007, eleven adults of a new invasive forest pest, the banded elm bark beetle *Scolytus schevyrewi,* were captured in Otterburne. This new invasive insect to Canada attacks and breeds in both American and Siberian elm and has the potential to transmit Dutch elm disease. In 2008, Manitoba Conservation increased the number of elm bark beetle pheromone trapping locations across southern Manitoba and several *S. schevyrewi,* were captured in 2008 and 2009. In 2010, no adults of the banded elm bark beetle were caught on the provincial traps. Manitoba Conservation has been collaborating in a University of Manitoba MSc project investigating the biology and life cycle of *S. schevyrewi* in the Prairie Provinces and traps with this project captured 10 adults in 2010.

Eastern Larch Beetle

Plots established in spring 2008 to monitor tamarack mortality from eastern larch beetle were assessed for a third fall season. Tree condition and measurements of height and diameter of tamarack were recorded and data from tamarack infested by eastern larch beetle were summarized. After three seasons, tree mortality averaged 10% per year, there was a significant increase in eastern larch beetle attacks in 2010 and more than 50% of the larch are now dead and declining. The remaining healthy tamarack larch were mainly trees with diameters less than 15cm dbh. The increased attacks were probably caused by the higher than average precipitation during the growing season. Other notable effects of the continuing eastern larch beetle outbreak were: 1) loss of large trees impacting the habitat for the Great Grey Owl, 2) little cone/seed production and poor regeneration and 3) an increase in vegetative competition in infested tamarack stands.

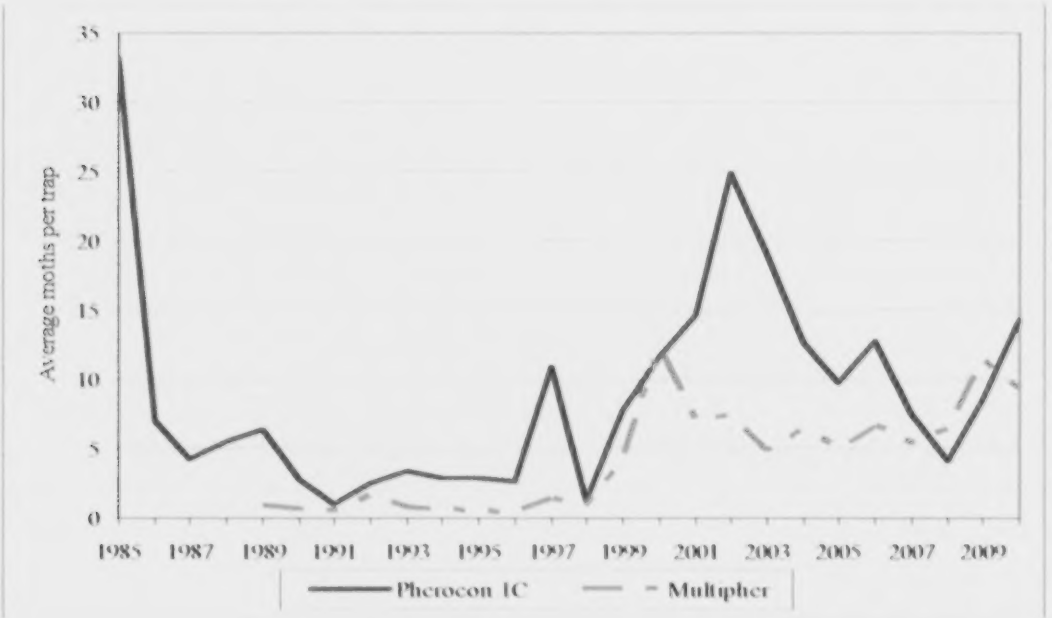
Jack Pine Budworm

Defoliation by jack pine budworm, *Choristoneura pinus pinus,* continues to be negligible throughout the jack pine (*Pinus banksiana*) forests in Manitoba. Adult males of jack pine budworm have been captured with pheromone-baited traps since 1985. This trapping method is being evaluated as an early warning method for outbreaks and a supplemental technique to defoliation predictions by egg mass density surveys.

In 2010, the number of trapping locations was reduced to the three sites (Belair, Shilo and Nopiming) which had an increase in moth captures in 2009. Two trap types, Pherocon 1C and MULTIPHER®, are being field tested for capture efficiency using a 0.03% or 100 µg concentration

of pheromone lure. In 2010, the average number of male moths increased in the Pherocon traps while fewer moths were captured the MULTIPHER@@ traps (Figure 2). This year's average was 14 moths per Pherocon trap and 9 moths per MULTIPHER@@ trap.

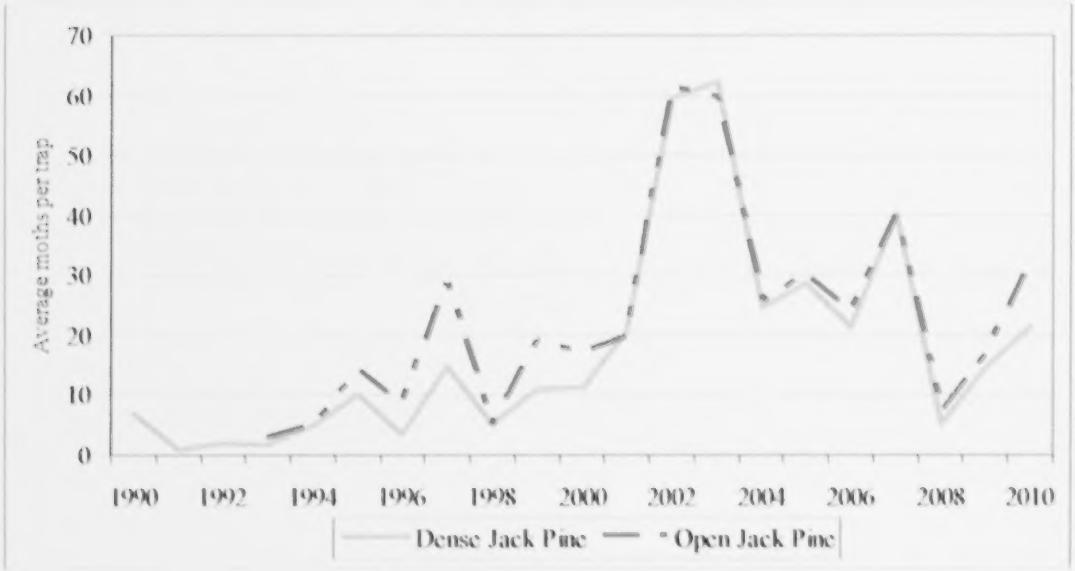
Figure 2. Annual Average Capture of Male Jack Pine Budworm Moths in Two Trap Types



Branch assessment for defoliation and egg masses were completed. No defoliation and no egg masses were recorded. Pollen cone bud levels for 2011 are predicted to be 52% on the branch tips.

The Sandilands Provincial Forest was designated as a demonstration site for the Jack Pine Budworm Decision Support System in 1991. Fourteen pheromone locations were established and situated in mature, dense jack pine stands with three Pherocon 1C traps per site. An additional 10 sites were established in 1993 in overmature, open-growing jack pine stands to compare jack pine budworm population levels between the two stand types (Figure 3). In 2010, only 20 locations were monitored as four locations were removed because of fire or harvesting activities. Since 2001, moth capture levels had been almost equal between stand types. In 2010, the open jack pine stands showed an increase in the average number of captured moths compared to the dense stands. No defoliation and no egg masses were found during assessment of the branches. There has been little difference in the annual pollen cone bud levels between the dense and open jack pine stands.

Figure 3. Annual Average Capture of Male Jack Pine Budworm Moths in Two Stand Types



Large Aspen Tortrix

The large aspen tortrix, *Choristoneura conflictana*, infestation continued in 2010. Scattered defoliation was observed throughout the Western and Southwestern regions of Manitoba.

Gypsy Moth

Based on the increasing number of Gypsy moth adults and egg masses from 2006 to 2008, an aerial application suppression program to eradicate this invasive forest pest was conducted June 2009 in two areas outside of the City of Winnipeg. In La Salle and St. Germain, Manitoba, 200 and 500 hectares respectively, were treated with the biological insecticide Foray 48B, a formulation containing *Bacillus thuringiensis kurstaki (Btk)*. Three applications of the insecticide, applied within a two week period, targeted the first, second and third larval instars of Gypsy moth. Insect development times were provided by the Canadian Forest Service, Laurentian Forestry Centre using their BioSIM software.

To confirm effectiveness of the eradication program, moth captures and egg mass surveys were conducted in both treated areas for 2009 and 2010, in conjunction with the Canadian Food Inspection Agency. One moth was captured in 2009 but none in 2010. No viable egg masses were found within the treatment areas in either year. Manitoba will not be regulated for European Gypsy moth by the Canadian Food Inspection Agency in 2011.

Invasive Forest Pests and Movement of Firewood

Manitoba is concerned about the spread of invasive forest insects and diseases through the movement of firewood. Since 2008, four wood collecting bins have been established on major highways at the provincial boundaries: two along the TransCanada Highway and one each at Highways 5 and 16. For 2010 in three of the four wood collecting bins, travelers have deposited numerous pieces of pine, ash and other tree species. Manitoba Conservation is asking the public not to transport firewood into the province and to deposit any wood they have with them in the bins.

A new forestry display was developed and has been utilized at trade shows, fairs, municipality and cottage association meetings to inform the public about invasive forest pests and encourage them to purchase and use firewood locally wherever they travel.

Leaf Diseases of Deciduous Trees

In 2010, anthracnose diseases of deciduous trees were prevalent throughout southern Manitoba. Damage from diseases commonly occurs after cool, wet weather during bud break and early leaf development. Maples, ash, oaks and elms all displayed symptoms of necrosis on their leaves this year. Elm anthracnose (black spot of elm) was present in urban areas.

Poplar leaf diseases were also very prevalent in 2010. Common leaf spots such as *Marssonina* and *Septoria* leaf spot were common on native and hybrid poplars. *Melampsora* leaf rust was common on poplars especially plains cottonwood and balsam poplar. This disease resulted in extensive discolouration and premature leaf drop throughout heavily infested areas.

FOREST PEST CONDITIONS IN SASKATCHEWAN 2010

Rory McIntosh

Saskatchewan Ministry of Environment
P.O. Box 3003, McIntosh Mall
201–1061 Central Avenue
Prince Albert, SK S6V 6G1

Abstract

DEFOLIATORS – SOFTWOOD

Spruce budworm *Choristoneura fumiferana*

Following a general decline 2002–2008 the eastern spruce budworm *Choristoneura fumiferana* outbreak is beginning to increase again in Saskatchewan. Aerial surveys conducted in 2007 showed an area of 89,578 hectares. In 2008 the area of moderate to severe defoliation had further declined to 12,160 ha; in 2009 this area increased slightly to 33,407 hectares but in 2010 had increased to 85,466 hectares of moderate to severe defoliation (Figure 1). A new area in the northwest was detected as well as increasing defoliation in north-central Saskatchewan west of La LaRonge (Figure 2).

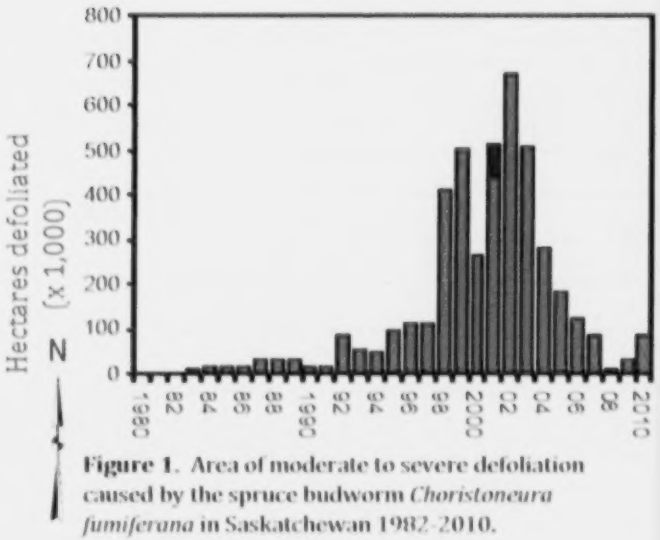


Figure 1. Area of moderate to severe defoliation caused by the spruce budworm *Choristoneura fumiferana* in Saskatchewan 1982–2010.

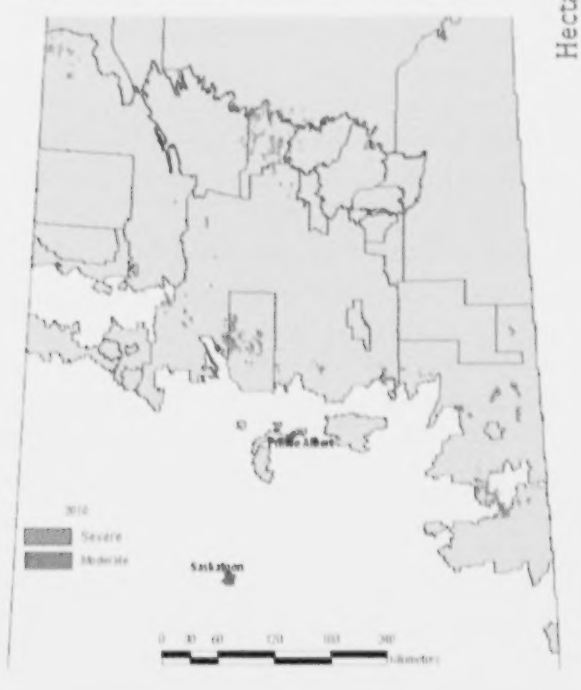


Figure 2. Area of moderate to severe defoliation caused by the spruce budworm *Choristoneura fumiferana* in Saskatchewan 2010.

Conclusions for 2010, Predictions for 2011

In 2010 10,000 hectares of forest was sprayed using Foray 76B, at a rate of 30 BIU/1.5L/ha. Cool spring temperatures together with extreme wet weather hindered implementation of the spray operations. Although defoliation in the spray blocks exceeded the 40% target, over wintering L2 surveys reveal significantly lower larvae in spray as compared to control blocks.
SBW populations continue to build in three areas of SK. Over wintering L2 surveys conducted in the Hudson Bay area in the southeastern part of the province reveal significant population growth (Figure 2). The Ministry is planning a spray program for 2011 to treat approximately 20,000 hectares with Btk.
Between 2006-2009 spruce budworm defoliation has been building in the Cypress Hills Interprovincial Park – specifically in the Battle Creek area in the West block. No defoliation was detected in aerial surveys in 2010. Ground surveys show low populations and as such the outbreak appears to have collapsed.

Jack pine budworm *Choristoneura pinus pinus*
In 2010, there was no detectable Jack pine budworm defoliation in Saskatchewan. Jack pine budworm – a periodic defoliator of jack pine has not reached outbreak levels in Saskatchewan since the 1980's. As part of an ongoing monitoring and early detection program initiated in 2006, the Ministry continues to monitor using a grid of 72 pheromone traps, deployed in mature jack pine stands across the commercial forest zone.

Defoliators – hardwood

Large Aspen Tortrix *Choristoneura conflictana* and
Forest Tent caterpillar *Malacosoma disstria*

In 2010, the area defoliated by Large Aspen Tortrix continued to decrease to 11,067 ha. Defoliation was predominantly in the Deschambault and Jan Lake areas in the northeast, and in Duck Mountain PP in the southeast. Areas detected in 2008 and 2009 in the north-western part of the province along the Churchill River, have collapsed.

Figure 3 Area of moderate to severe defoliation caused by the Large Aspen Tortrix *Choristoneura conflictana* in Saskatchewan 2010

Foliar Diseases

***Spruce needle rust* Chrysomyxa ledicola**

After two wet summers (2004-06) approximately 44,750 hectares was affected by Aspen leaf spot diseases, predominantly *Marssonina populi*. However, Aspen (hardwood) defoliation was not significant in 2008 and none was detected in 2009.

In 2010 a large area (8, 120 hectares) of spruce needle rust *Chrysomyxa ledicola* (Figure 4) was confirmed following ground verification of aerial surveys. The outbreak was located Northwest of Prince Albert National Park and in Green Lake and Meadow Lake Provincial Parks (Figure 5).

Figure 4. Spruce needle rust *Chrysomyxa ledicola*.

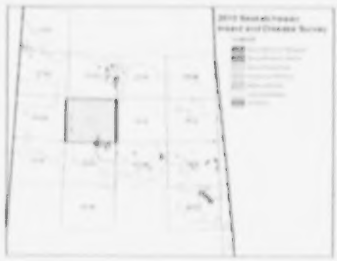


Figure 5. Area of spruce needle rust defoliation (green). Northeast of Prince Albert National Park.

Figure 6. Distribution of leaf spot disease detected in hardwood forests south of Meadow Lake Provincial Park in West central Saskatchewan in 2010.

Leaf spot disease in hardwoods - *Marssonina Spp.*

In 2010 Saskatchewan experienced one of the wettest summers recorded. As a result 2,841 ha of Aspen leaf spot was detected again in aerial surveys. Infected areas were located in western SK, south of the Air weapons range and Meadow Lake Provincial Park.

Invasive and non-native pests

Dutch Elm Disease *Ophiostoma novo ulmi*

In 1980 Dutch elm disease (DED) was first discovered in Saskatchewan (Regina). Since then, DED has slowly spread through most of the native elms in Saskatchewan (Figure 6). Saskatchewan Ministry of Environment's DED program was delivered using a $500,000 allocation and focused on protecting elm trees in communities (>400 Elms & 800 residents); and managing elm in wild forest areas in buffer zones outside urban areas.
Program components included:

- Regulatory controls
- Surveillance and early detection,
- Rapid removal and disposal of DED-infected trees.
- Cost share partnerships in 43 communities.

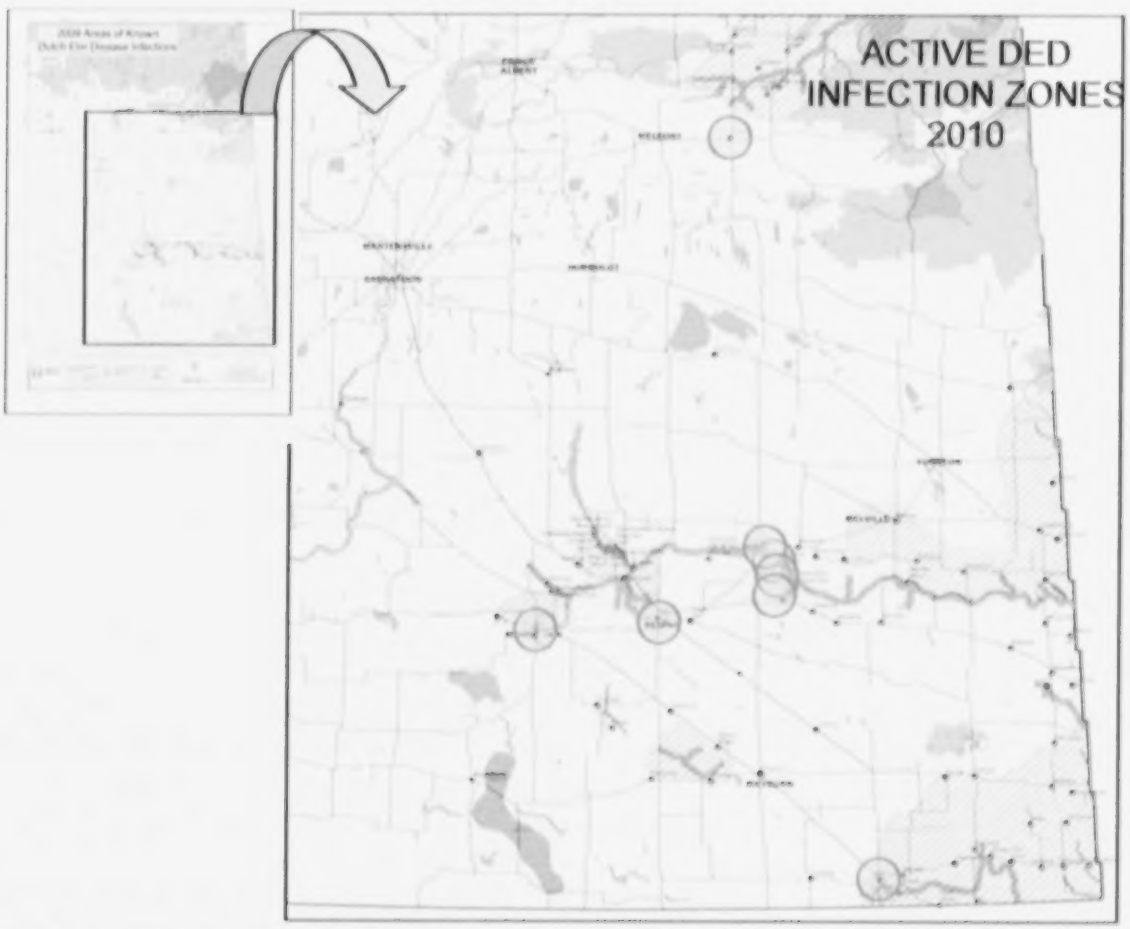


Figure 7. Distribution of Dutch elm disease active zones (red cross hatch) throughout Saskatchewan in 2010. Saskatchewan Ministry of Environment continues to survey in wild stands in 6 Buffer areas outside major communities and in 2 Provincial Parks (Circles).

Until April 1, 2010, Saskatchewan Ministry of Environment Forest Service Branch was responsible for implementing surveillance, detection and removal services to manage DED in 43 communities and buffer areas across Saskatchewan. In these communities, responsibility for the cost of these activities was shared through a cost-share agreement with the ministry. Following the 2010 spring budget decision, the Ministry still surveys buffers in rural areas around six urban communities in the high risk areas in southeastern Saskatchewan. It is the responsibility of the private land owners to remove and dispose of the infected trees as well as cover the expense of removals. The Ministry also surveys two provincial parks in the high risk area (Echo Valley and Katepwa) Under a Memorandum of Understanding between The Ministry of Environment and the Ministry of Tourism, Parks, culture and (TPCS), the Parks are responsible for cost or removals.

In 2010, survey results show that the number of DED infected trees in the buffers and provincial parks, (with the exception of Regina) are similar to the previous year (Table 1). It is anticipated that the effects of the reduction in DED management services will likely be felt in the next couple of years.

Table 1 Number of DED infected trees marked for removal in the six buffers and two parks in Saskatchewan in 2009 and 2010

Buffers	Removed		Parks	Removed	
	2009	2010		2009	2010
Estevan	9	2	Katepwa Point	2	1
Regina	61	26	Echo Valley	90	101
Moose jaw	25	20		0	0
Indian Head	18	13		0	0
Fort Qu'Appelle	63	69		0	0
Tisdale	4	0		0	0
Total	**180**	**130**		**92**	**102**

European Gypsy Moth *Lymantria dispar*

Gypsy moth (Figure 8) is a significant exotic pest threat to hardwood forests in Saskatchewan. In 2010, the Canadian Food Inspection Agency (CFIA) continued ongoing monitoring in Saskatchewan deploying 462 Tréce delta traps baited with Gypsy Moth String Lure. The target invasive pests, and relative trapping effort in the monitoring program were as follows:

- European Gypsy moth *Lymantria dispar* - 423 traps (includes 30 in City of Saskatoon, and 50 in City of Regina)
- Asian Gypsy moth *L. dispar*- 18 traps
- Pink Gypsy moth *L. Mathura* - 23 traps

Municipal trapping programs included:

- City of Saskatoon - 30 traps
- City of Regina - 24 traps

Figure 8 Gypsy Moth egg mass.

NO GYPSY MOTHS WERE FOUND IN ANY OF THE TRAPS IN SASKATCHEWAN IN 2010

Banded elm bark beetle *Scolytus schevyrewi*

In 2004, Saskatchewan first deployed a network of pheromone-baited monitoring traps at 15 locations across the southern extent of the province. The monitoring program was continued until the 2006 discovery of Banded elm bark beetles *Scolytus schevyrewi* (BEBB) in Medicine Hat AB. There was a need to modify and expand the program.
In 2007, and in collaboration with CFIA, Saskatchewan Ministry of Environment extended the monitoring to include 10 major communities across the southern part of the province. Sticky panel traps baited with 90-day elm bark beetle lures[1]. BEBB were detected in traps located in **five** of these communities: Maple Creek, Assiniboia, Moose Jaw, Weyburn and Estevan. In 2008, the trapping effort was expanded in each of these positive locations to determine the extent of the infestation and confirm if populations are establishing. Current distribution of BEBB is shown in Figure 9.

[1] Contech Inc. 7572 Progress Way, Delta, British Columbia V4G 1E9

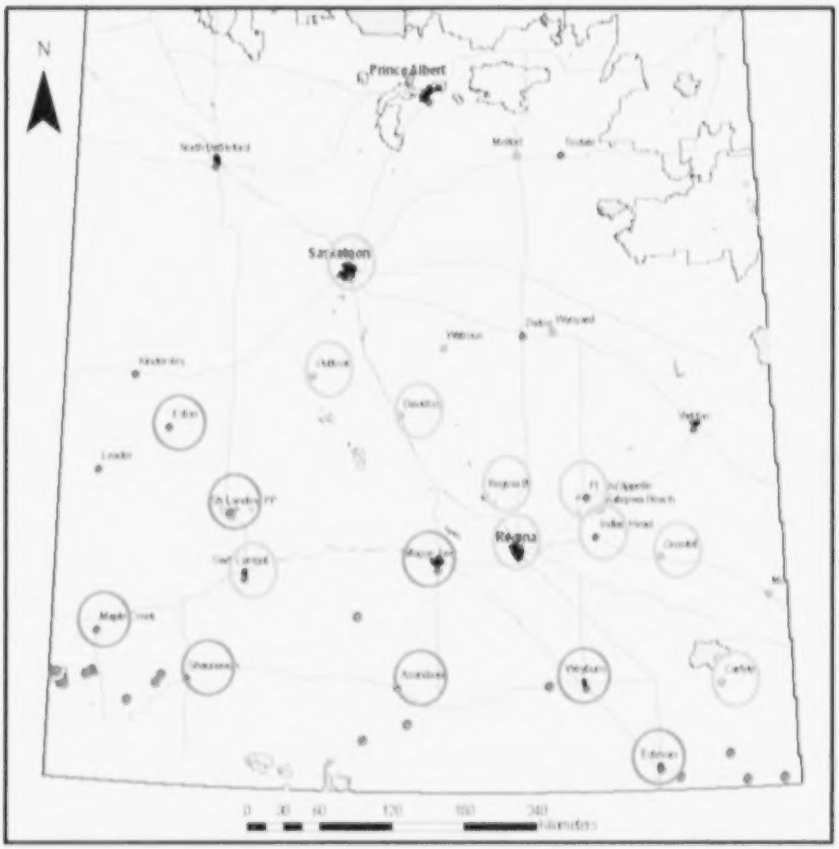


Figure 9. Map showing focus of monitoring program and the spatial distribution and spread of Banded elm bark beetles discovered in Saskatchewan, 2004-2010.

By 2010 BEBB has spread to most of the major urban centers including Saskatoon, Regina, Moose Jaw, and Swift Current throughout the southern half of the province. The beetle has been collected just outside the city of Saskatoon, which is currently this most northerly extent of the known range in Saskatchewan. It is now clear the beetle is established in Saskatchewan. Monitoring for this insect is ongoing.

Mountain pine beetle *Dendroctonus ponderosae*

The risk of mountain pine beetle (MPB) spreading eastwards and establishing in Saskatchewan's boreal jack pine forests continues to be the primary concern. In SK there still remains the opportunity to focus on proactive, **Preventive** approaches instead of active beetle-focused **Suppressive** action.
Since 2002, Saskatchewan Ministry of Environment (MOE) has implemented regulatory controls to prevent the long distance, human caused, spread of MPB into the province. In July 2008, this restriction order was strengthened by designating MPB a pest under *The Forest Resources Management Act* (FRMA) and designating the lands where the moratorium is to be enforced. This designation enables greater powers of inspection and mitigative action under the FRMA.

Saskatchewan's strategic approach to the MPB threat is very similar to that of fire-fighting – early detection leading to immediate, rapid and aggressive response. To help focus surveillance and detection of MPB, SK has implemented risk and susceptibility mapping – forest-focused approaches aimed at determining the extent and distribution of susceptible pine in the western part of the province. The distribution of these high risk stands, coupled with fire disturbance data are used to help focus efficient aerial and ground surveillance activities (Figure 10).

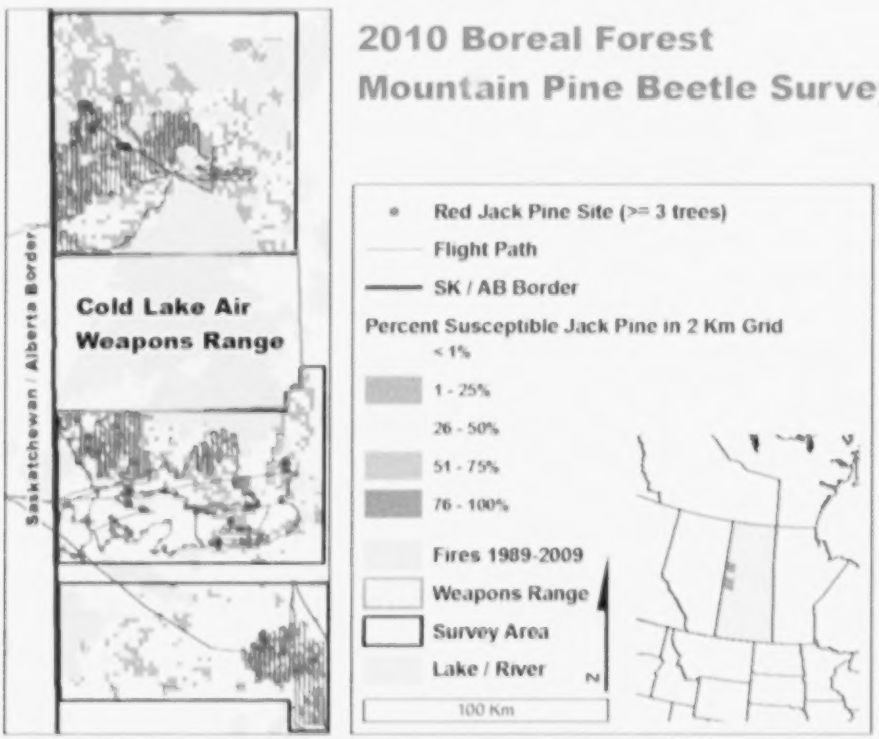


Figure 10. Map of western Saskatchewan showing areas North and South of the Cold Lake Air Weapons range where Saskatchewan Ministry of Environment conducts extended aerial monitoring prioritized on the distribution of susceptible pine stands.
The surveillance program is divided into two components: the Northern Boreal forest and Cypress Hills Inter-provincial park (CHIPP)

Northern Boreal Forest Surveys

The 2010 aerial survey of the boreal forest identified 336 sites with over 1,500 suspect "reds" (i.e., recently dead jack pine). A proportion of these locations were ground-truthed (where access permitted). During the ground survey of the boreal forest, 31 locations with approximately 200 dead jack pine trees were examined for evidence of attack by MPB and other biotic and abiotic agents. The most common damage agents found in the "red" trees in the boreal forest were: engraver beetles *Ips* spp., sawyer beetles *Monochamus* spp., and root rot *Armillaria* spp.

Cypress Hills Inter-provincial Park (CHIPP) surveys

Saskatchewan Ministry of Environment has been monitoring MPB in the CHIPP since the last outbreak declined in 1985/86. Aerial overview surveys are used to locate all red trees, shown as the red dots on the map (Figure 11). These observations are then verified with detailed ground surveys. All locations shown on the map are confirmed, heavily MPB-attacked trees that have been marked for removal in fall and burn operations.

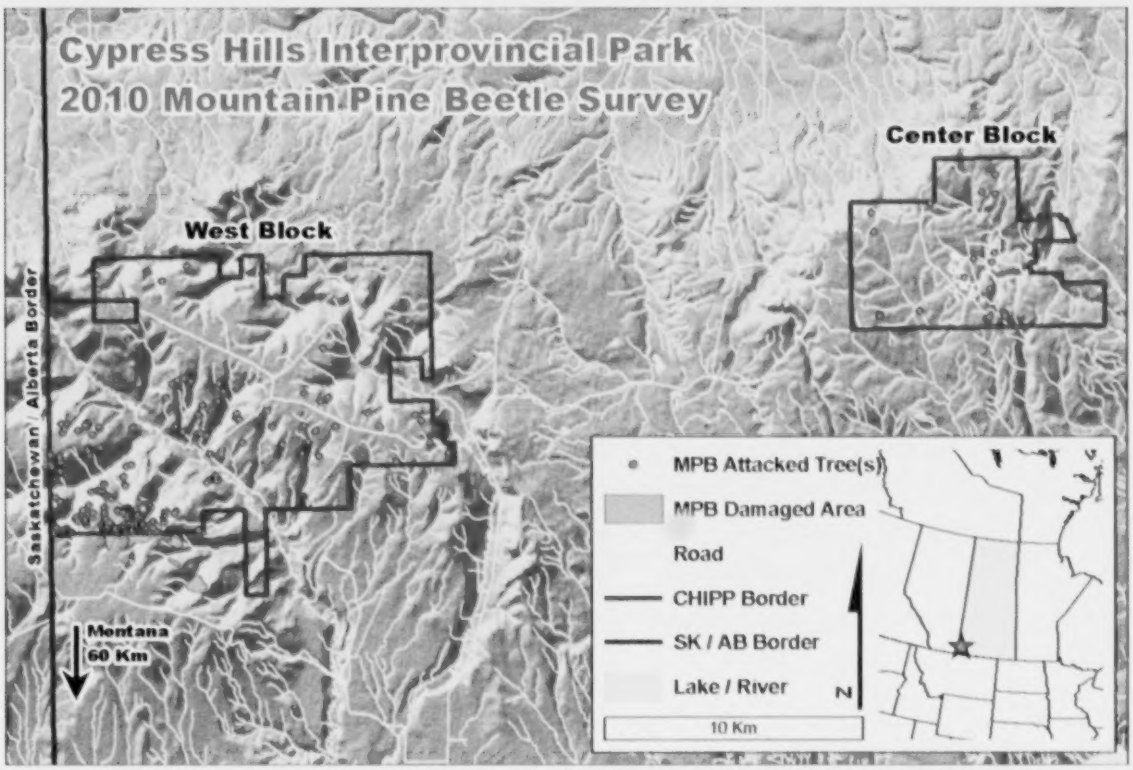


Figure 11. Location and distribution of Mountain pine beetle infested trees detected through aerial surveys and confirmed by ground checks in the West Block of the Cypress Hills Inter-provincial Park in southwestern Saskatchewan, 2010.

The chronology of survey results in the CHIPP (see Figure 12) is as follows:

- In **2006** SK began systematic aerial surveillance work in Cypress Hills. Only **2** MPB killed trees were found.
- In **2007** aerial surveys to detect MPB revealed numerous red trees – **2** of which contained mountain pine beetle. These trees were felled and burned and slabs of bark containing beetles were removed for research purposes.
- In **2008** the number of red trees increased again. Following ground surveys **34** trees containing significant numbers of MPB and were marked for removal by fall and burn.
- In **2009** the number or red trees increased significantly –There were **170** "fall and burn" trees discovered and 59 treated by "peeling", mostly in the South Benson Area. The outbreak area now includes trees killed on private land to the south of the CHIPP. SK is working with CFS and First Nations to remove over 300 trees in this area.
- In **2010** the number or red trees continued to increase –There were **209** "fall and burn" trees discovered and 67 were peeled immediately and 142 marked for fall and burn operations.

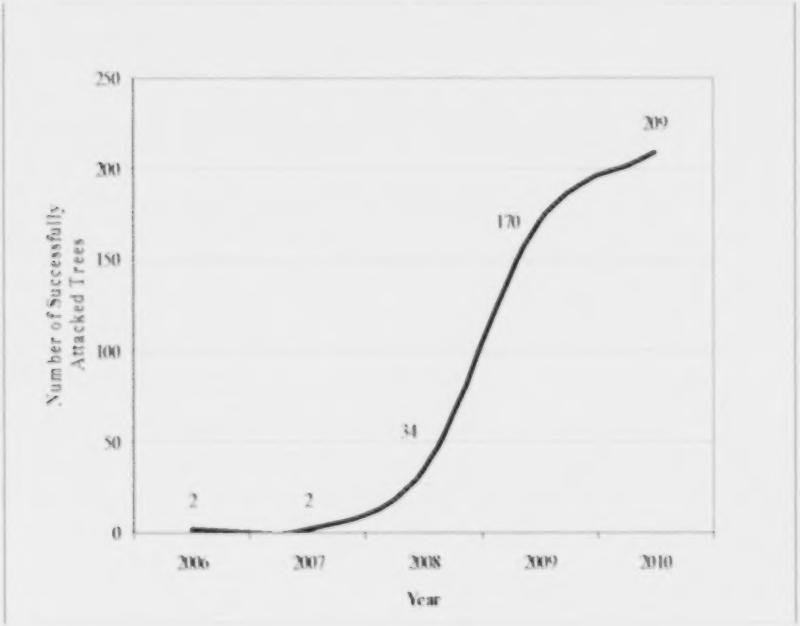


Figure 12 Cypress Hills Interprovincial Park mountain pine beetle survey history, showing the number of successfully attacked trees identified from 2006-2010.

Since this outbreak is located across multiple jurisdictions, including private land to the south of the CHIPP, SK is working with CFS and First Nations to remove infested trees on first Nations lands outside of the park boundaries. The ministry is also working with the Province of Alberta and Ranchers and municipal leaders to develop a collaborative, regional approach to managing Mountain pine beetle in this area.

CURRENTLY NO MOUNTAIN PINE BEETLES ARE FOUND IN SASKATCHEWAN'S BOREAL FOREST

Acknowledgements:

Significant contributions to compiling this report were made by the following: Robert Moore and Jeffery Gooliaff, Saskatchewan Ministry of Environment; and Brian Poniatowski, Brian Ehnes and Steven Oldford, BioForest Technologies Inc.

Summary of the 2010 Forest Health Conditions in Alberta

Dan Lux

Alberta Sustainable Resources, Sustainable Resource Development
Great West Life Building
9920-108th Street
Edmonton, AB T5K 2M4

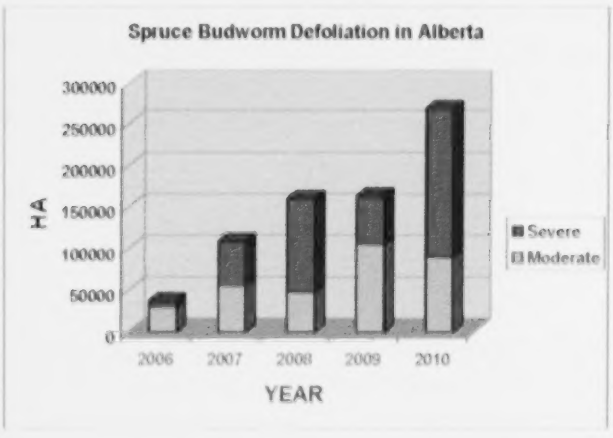
Abstract

Vision for the Forest Health Program in Alberta

To lead Canada in science-based, proactive, adaptive and innovative management of damaging forest health agents in a forest environment with a multitude of values and challenges posed by a changing climate.

Eastern Spruce Budworm

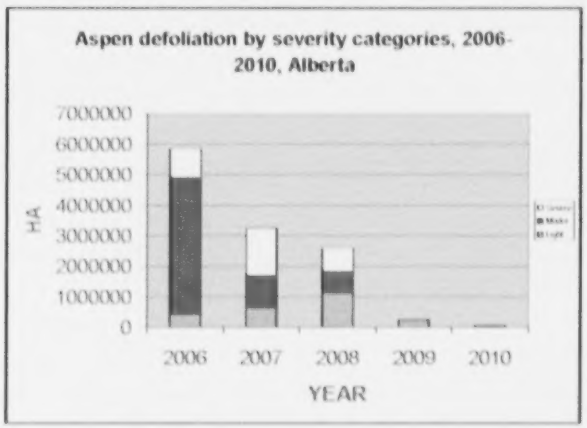
Defoliation Severity	2009 (Hectares)	2010 (Hectares)
Moderate (35 – 70%)	105,420	90,782
Severe (Over 70%)	58,281	178,585
Total	163,701	269,367



We are proposing a spray program for 2010. We will know if funding is available by mid-December.

Aspen Defoliators

Causative Agent	2009 (ha)	2010 (ha)
Bruce Spanworm	79,868	50,765
Forest Tent Cat	95,847	10,333
Large Aspen Tortrix	71,353	1,502
TOTAL	247,068	62,600



All of our maps and all pest conditions can be found at:
http://www.srd.ab.ca

OTHER INTERESTING FOREST HEALTH PROJECTS

Western Spruce Budworm

In 2009, we had over 30,652 ha of moderately defoliated stands in southern Alberta, this year the populations have crashed and we did not map any significant damage.

Hail Damage

12,798 ha of regenerating and mature stands were impacted. Some stands were severely damaged with 80% to 100% mortality. We are putting in some long term plots to follow the progress and to determine if rehabilitation is required.

Climate Change Impacts on the Productivity and Health of Aspen (CIPHA)

We have taken over the plots initially established by Dr. Ted Hogg at the Northern Forestry Center. We will continue to supply the Dr. Hogg with the data. We are looking to expand the sampling protocols to spruce stands next summer.

Mountain Pine Beetle

A massive in-flight of mountain pine beetles occurred in the summer of 2009. The beetles moved several hundred kilometres east in the province. The beetles have now killed pine trees east of Slave Lake; some of the stands in and around Slave Lake are 100% killed. We also experienced a massive in-flight in 2006, and smaller in-flights in 2007 and 2008.

We started our spring surveys to look at overwintering survival and evaluate the risk of spread on May 15, 2010. The r-value relates directly to how a beetle population is expected to spread during the beetle flight in July and August. Overall, there was higher beetle mortality compared to last year (2009). Spring survey results are used to set priorities for the late summer and fall beetle program.

Initial ground surveys this fall indicated there was no large in-flight of beetles from British Columbia in 2010. While this discovery was good news, the MPB that attacked trees in 2009 successfully reproduced and flew in July this year to infest more trees. As a result, there are a large number of newly-attacked trees in the west-central region that pose a significant risk of spread further eastward in the highly-connected pine stands leading toward Saskatchewan.

The beetle control program is essential to contain the risk of spread in the leading edge as much as possible. The risk of future in-flights from B.C. still exists and is projected to continue until 2014, when current population models in British Columbia are expected to peak along the Alberta border and begin to recede.

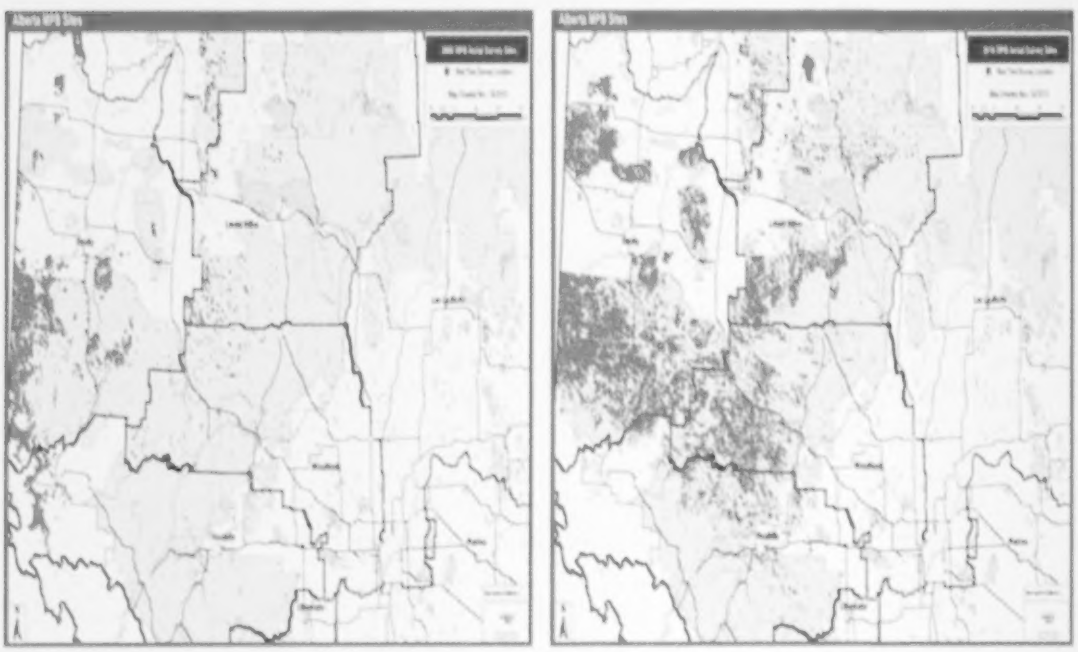
Mountain pine beetle threatens six million hectares of Alberta forests containing pure or mixed pine stands. The value of the standing timber in Alberta alone – just to industry – is estimated at more than $8 billion in present-day dollars. Nearly 26,000 Albertans and 50 Alberta communities depend on the forest industry for their livelihood (direct and indirect jobs). Right now, there are

25 major forest companies (Annual Allowable Cut of 10,000 m^3 or greater operating in Alberta. More than half of them (14) rely on pine to continue operations.

In Alberta, MPB outbreaks threaten 90,000 hectares of watersheds in Southern Alberta. Of this area, 8,000 hectares are the primary source of drinking water for southern Alberta communities and further east, and another 5,000 hectares are secondary drinking water sources.

As a result, our Department has invested over 200 million dollars over the last 4 years to manage the impacts of mountain pine beetle. You can find the Alberta management Strategy at www.mpb.alberta.ca.

Aerial Survey Results Comparing 2008 to 2010 in the West Central Part of the Province



BRITISH COLUMBIA REPORT

Janice Hodge for Tim Ebata

JCH Forest Pest Management
7700 Dejong Drive
Coldstream, BC V1B 1P3

Abstract

In the summer of 2010, the provincial aerial overview survey was conducted by survey contractors and Ministry of Forests, Lands and Natural Resource Operations staff. Approximately 86% of the provincial landbase was flown which is an increase from 82% flown in 2009 (Figure 1). All forested lands are flown and included in the survey regardless of land status and ownership. Some delays in completing the survey were caused by large wildfires in the Cariboo region in the province's central interior but smoke conditions abated in late August which allowed the completion of the survey during the ideal survey window. Bark beetles, defoliators and other disturbance caused by forest health agents that were visible during the survey were recorded and the data summarized using GIS by November 2010.

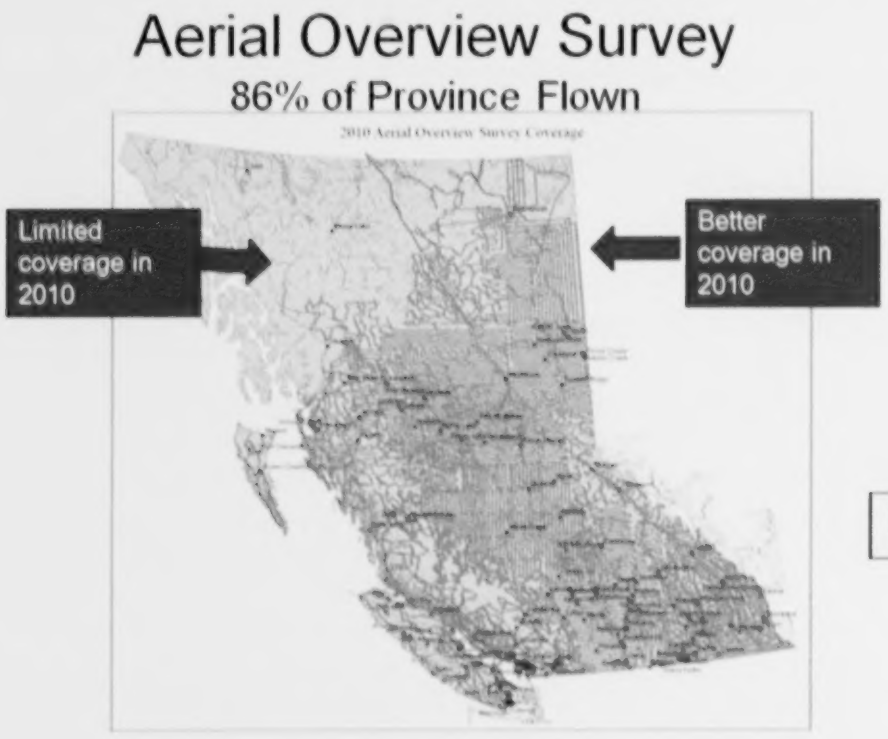

Aerial Overview Survey
86% of Province Flown
2010 Aerial Overview Survey Coverage
Limited coverage in 2010
Better coverage in 2010

Figure 1

Mountain pine beetle continued to be mapped over extensive areas of the province but the outbreak has declined in area for the third straight year from its peak in 2007 of over 10 million ha (Figure 2). In 2010, 6.261 million ha of red attacked trees was mapped and most of the new damage was recorded in the northern edge of the outbreak in the Ft. St. James, Mackenzie and Peace forest districts (Figure 3). The outbreak originated in the central interior and has ended in this portion of the province due mainly to host depletion. Young pine mortality has been recorded throughout the outbreak period but was thought to have subsided in the Prince George and Vanderhoof districts but beetles from the northern outbreaks appear to have "blown back" into these districts and killed a substantial number of young (~20 yr and older) pine. MPB are continuing to be observed attacking isolated pine on the very southern boundary of the Fort Nelson district but harsh climatic conditions and limited host will likely slow the northern advance of the beetle. In the southeast portion of the province, attack levels are lighter than projected and beetle suppression efforts are still being deployed effectively in certain landscape units. Annual updates to the provincial projection model using the current aerial overview survey data has resulted in a reduction in the overall impact estimate of the beetle but the current estimate of the cumulative volume killed for 2009 is 620 million cubic meters which represents 65% of the province's volume of mature pine (a decline from last year's estimate of 71%). A full report is available at http://www.for.gov.bc.ca/hre/bcmpb/.

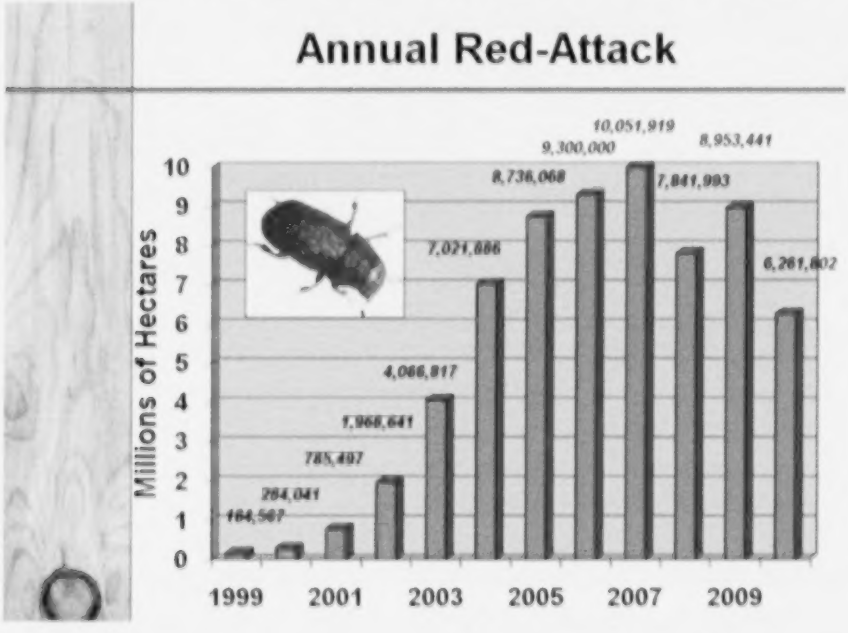


Figure 2

Figure 3

Douglas-fir beetle attack rates appear to have declined in most of the central interior but have unexpectedly increased on the south coast where it has rarely been reported causing significant damage (Figure 4). This beetle is not as aggressive as mountain pine beetle but it attacks large diameter old growth Douglas-fir. These trees not only are valuable for timber but they also represent important habitat for mule deer and other wildlife and thus justifying protection efforts.

Figure 4

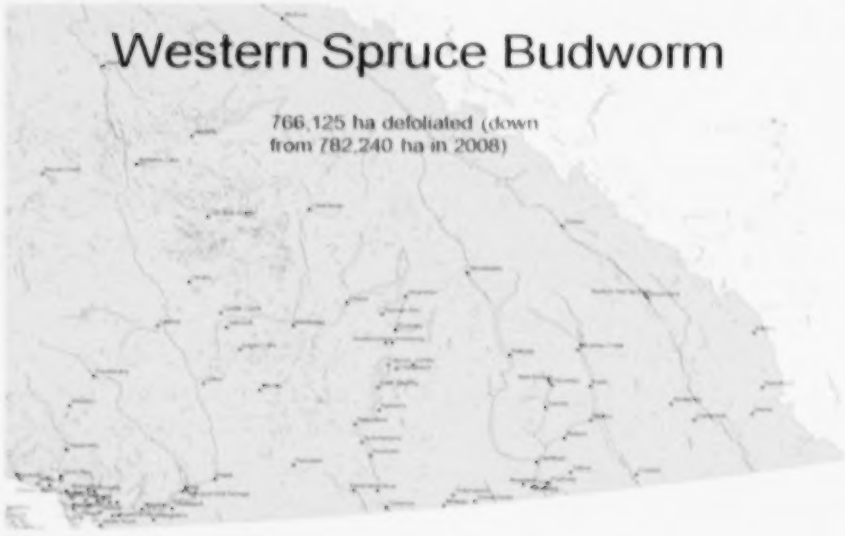


Figure 5

Several major forest defoliators were very active in 2010. The largest outbreak of a conifer defoliator continues to be the western spruce budworm that has been in ongoing for at least 10 years (Figure 5). Defoliation of interior Douglas-fir is occurring in the Kamloops, Cariboo and Merritt areas and covered over 766,000 ha. Small infestations were also noted in Quesnel (a notable extension of its northern range) and in the Crow's Nest pass area in southeastern B.C. A Btk treatment program was conducted in the June, 2010 in high priority stands located in the southern Cariboo region and in the Kamloops and Merrit areas. Just over 47,000 ha was treated with Foray 48B in a single application (Figure 6). This is a marked drop in treatment area from the record of 70,000 ha treated in 2009.

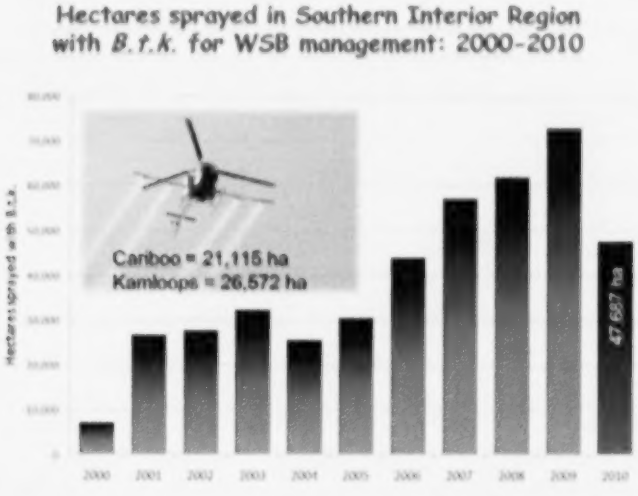


Figure 6

Another high profile conifer defoliator mapped in 2010 was the Douglas-fir tussock moth (Figure 7). Although it attacked only 16,302 ha, this damage is concentrated in lower valley bottom stands that are also where most of the private land is located. The severe defoliation and the allergic reactions (known as "tussockosis") caused by the larval hairs make this pest very important to the public and demands for treatment have been made on the province. This pest has a unique nucleopolyhedrosis virus that has been utilized as part of an integrated pest management process. The province's supply of NPV has not been depleted with 2010's application of 1,447 ha (Figure 8). Future supplies of NPV are being developed. Btk (Foray 48B) was also used to reduce damage in 7,637 ha of high priority stands on provincial land. Although NPV is effective at introducing the outbreak suppressing epizootic earlier than in untreated populations, the effect is not as immediate as with Btk which has shown excellent results (figure 9). Future treatments in 2011 will only use Btk to reduce larval populations and limit damage. It is expected that outbreak will collapse on its own in 2012.

Douglas-fir Tussock Moth
defoliation and spray block locations

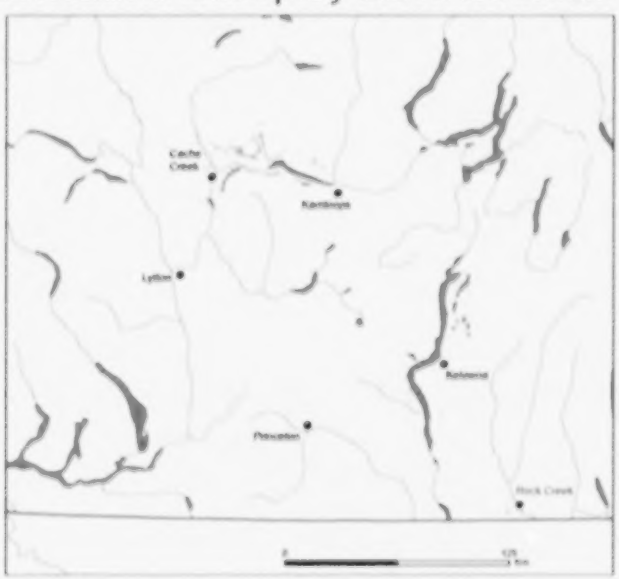


Figure 7

16,302 ha in 2010 vs. 17,512 ha in 2009

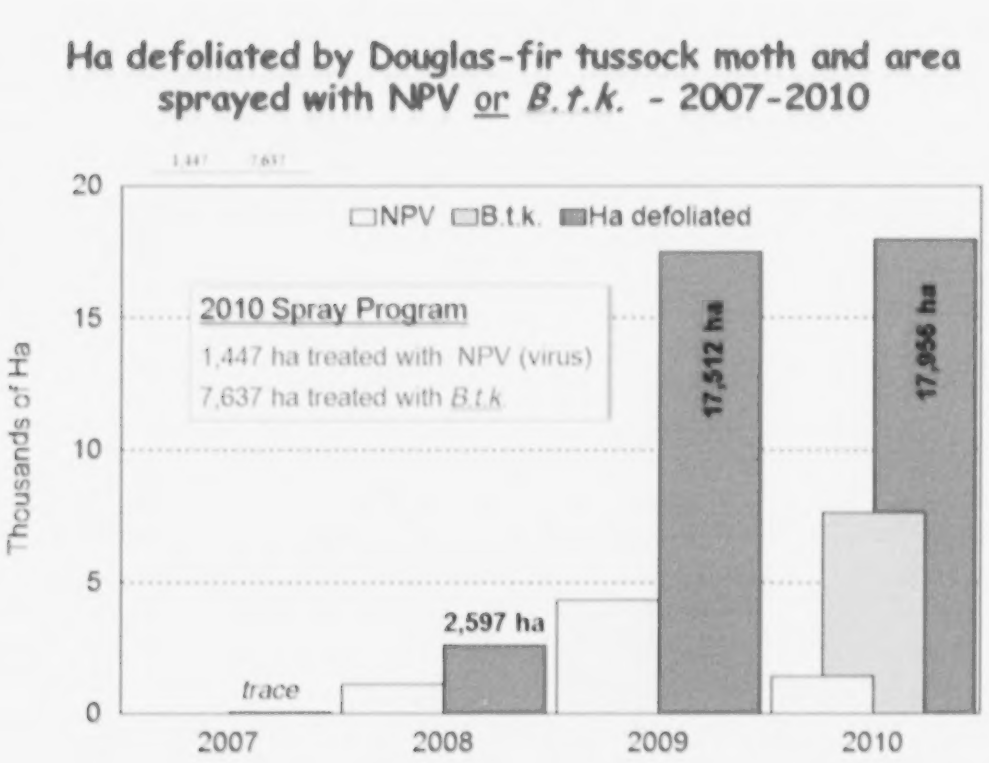


Figure 8

The North American strain of European gypsy moth (NAGM) was found in several locations in southern B.C. in the monitoring and delimiting trapping conducted by CFIA in 2009. Only two areas were deemed to have sufficient trapping information to warrant treatments. Downtown Richmond (figure 10), an area adjacent to one of Canada's busiest international airports, was selected for aerial treatment while a ground spray was conducted in a hazelnut orchard to eradicate a remnant population aerially treated in 2009. Poor spring weather conditions and conflicts with YVR air traffic control created numerous delays in completing the Richmond aerial spray. The 2010 trapping results showed that the aerial treatment was a complete success with no moths caught in the Richmond. In fact, only 12 moths were caught in the entire province which is the lowest total recorded since CFIA/Ag Canada have been monitoring for gypsy moth in BC. No treatments are planned for 2011 and only continued trapping for both NAGM and Asian gypsy moth will be carried out.

Barnes Lake – *B.t.k.* block for DFTM showing block boundary

Figure 9

An outbreak of blackheaded budworm covered over 87,000 ha mainly on Haida Gwaii and on the North Coast (figure 11). This defoliator is in its second year of an outbreak that began on Haida Gwaii. This insect has regular outbreaks on the islands and damage impacts have been studied by Dr. Vince Nealis, Pacific Forestry Centre. Damage is concentrated on western hemlock and can cause mortality, growth loss and top kill particularly in spaced stands where the investments may have been compromised. In some cases, this natural thinning agent is actually welcomed as hemlock tends to regenerate naturally in over-dense stands.

The most significant deciduous defoliator recorded in 2010 continued to be the Bruce spanworm that has been defoliating aspen in Northeast B.C. Over 1.6 million ha of defoliation was mapped throughout the Peace and Ft Nelson districts. This outbreak is expected to continue in 2011. Other notable forest health conditions included birch decline (figure 12) that has been noted by ground observations to be occurring throughout the southern portion of the province. The extent and severity of this dieback has yet to be quantified and the cause of the damage has not been

determined. Several hypotheses have been proposed to explain this damage and include tree age, drought, unusual spring freeze/thaw cycles, unidentified pest complexes and fire exclusion or a combination of all of these factors. Many knowledge gaps exist particularly in identifying the site and ecological conditions where the dieback appears to be most common as well as simply determining the causal agent(s).

Figure 10

Another potentially emerging issue is the presence of *Septoria musiva*, a native invasive canker fungus that has originated from Eastern Canada and was introduced into B.C. on hybrid poplar cuttings. Surveys looking for symptomatic native cottonwood and genetic typing have been conducted through a collaborative effort with Dr. Richard Hamblin of UBC/CFS and the province. Early results indicate about 2% of the native cottonwood have had positive identification of *S. musiva* on infected leaf samples. Further work is being done to improve the bioassay method to increase the speed of identification of infected samples to further define the extent and severity of the disease and determine the next course of action.

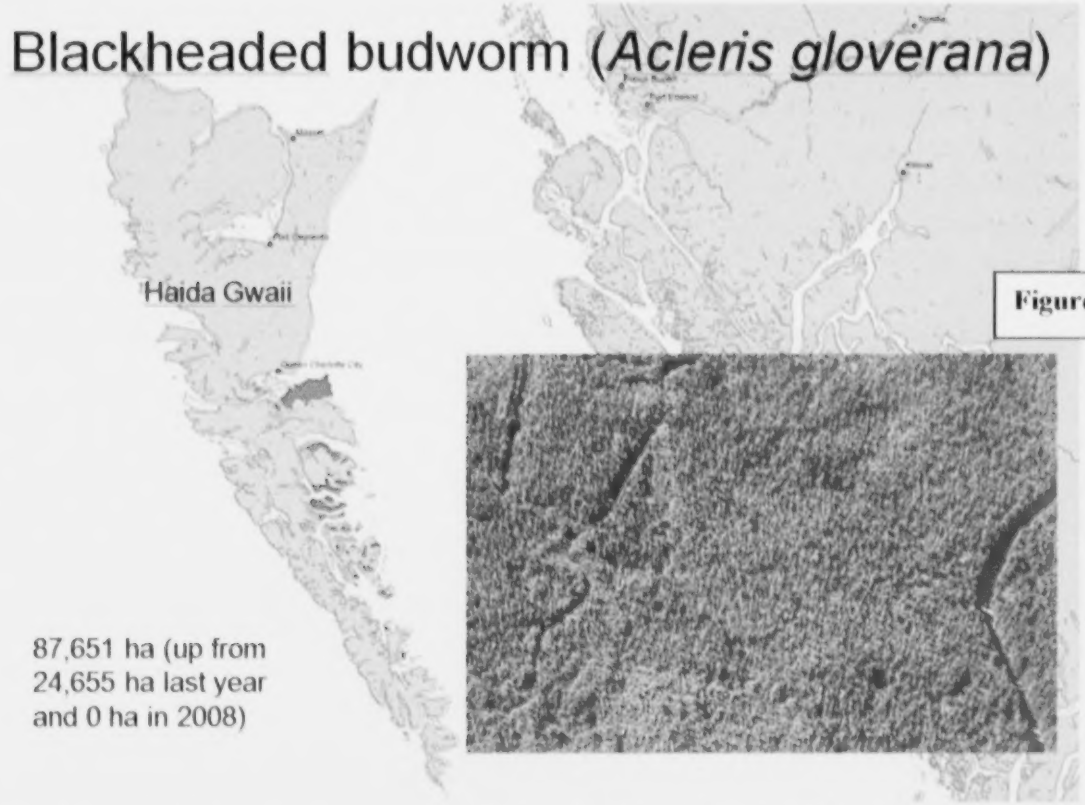


Figure 11

Other interesting things that happened in B.C. since 2009 have included the major reorganization of the "dirt ministries" in the provincial government, particularly with the Ministry of Forests and Range. In October 2010, the MFR was split and combined with Mines and Lands while the operational division joined a separate Ministry of Natural Resource Operations. By March 2011, with the election of new premier, Christy Clark, the reorganization was partially reversed and a new Ministry of Forests, Lands, and Natural Resource Operations was created. The organization sought to improve the efficiency of district operations by combining all of the permitting and referral operations into one office to ease the public and industry's workload by offering all of the required services through "one window".

Lastly, the stand development monitoring (SDM) protocol was implemented throughout the province. In B.C., projections of growth and yield in managed stands have been left to models with very limited field data to support them. Without a scheduled systematic inventory of young stands, particularly after they have been declared free-growing (usually between 8 to 12 years of

age) and not until age 60, timber supply analysts have little information to determine whether or not the models are adequately projecting their performance. The SDM survey was developed over the last five years to attempt to fill this information void and several districts have participated. Early findings indicate that the majority of stands are performing reasonably well but there several areas of the province where significant decreases in density have occurred as well as shifts in leading species due to pest damage. Surprisingly, the most common damaging agent are not insects or diseases but wildlife and abiotics (snow press, in particular). Other notable pests are root diseases and stem rusts of pine (including white pine blister rust). These surveys will continue and will be providing valuable feedback to forest managers throughout the province.

Birch Decline

Paper birch (*B. papyrifera* L.) in SE BC

Figure 12

A more complete description of the 2010 provincial aerial overview survey results and highlights from the province's forest health program are available in the annual "Forest Health Conditions in British Columbia" report available at: http://www.for.gov.bc.ca/hfp/health/overview.htm.

SESSION X: INVASIVE ALIEN SPECIES RESEARCH

Chair: *Rod Smith*
Natural Resources Canada, Canadian Forest Service

SEANCE X : RECHERCHE SUR LES ESPECES EXOTIQUES ENVAHISSANTES

Président : *Rod Smith*
Ressources naturelles Canada, Service canadien des forêts

DEVELOPMENT OF BRANCH SAMPLING FOR EARLY DETECTION OF THE EMERALD ASH BORER, *AGRILUS PLANIPENNIS*, IN INDIVIDUAL URBAN TREES

Krista L. Ryall, Jeffrey G. Fidgen, and Jean J. Turgeon

Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre
1219 Queen Street East
Sault Ste. Marie, ON P6A 2E5

Abstract

The emerald ash borer, *Agrilus planipennis Fairmaire*, is an exotic invasive insect causing extensive mortality to ash trees, *Fraxinus* spp., in Canada and the United States and. Detection of incipient populations of this pest is difficult because of its cryptic life stages and the existence of a multiyear time lag between initial attack and the appearance of visible signs or symptoms. We sampled branches from individual asymptomatic ash trees to develop a sample unit capable of detecting low density *A. planipennis* infestation. Data from asymptomatic infested trees were used to identify optimal sample size that maximized detection rates, while minimizing sampling effort. The recommended sample size provided a detection rate of approx. 80% at low *A. planipennis* densities. This procedure detected 2.7-times more infested trees compared to sampling ¼ of the circumference of the trunk at breast height. This sampling method lead to the detection of infested trees prior to the appearance of signs or symptoms, was less destructive to a tree than the removal of bark from the main stem, and could be incorporated into routine sanitation or maintenance of city-owned trees. Detection of infested asymptomatic trees provides managers with additional time to develop and enact management strategies for this exotic pest than is currently afforded by other techniques such as visual surveys and removing of bark from the trunk of the tree.

Résumé

L'agrile du frêne (*Agrilus planipennis* Fairmaire) est un insecte envahissant exotique qui cause la mort d'un très grand nombre de frênes (*Fraxinus* spp.) au Canada et aux États-Unis. La détection des nouvelles infestations est difficile parce que ce ravageur se développe à

l'intérieur de l'hôte et que plusieurs années s'écoulent entre l'attaque initiale et l'apparition des premiers signes ou symptômes visibles. Nous avons récolté des branches sur des frênes asymptomatiques en vue de développer une méthode d'échantillonnage permettant de détecter la présence de populations du ravageur de faible densité. Nous avons utilisé les données recueillies à partir de ces frênes asymptomatiques infestés pour établir la taille de l'échantillon permettant d'optimiser les taux de détection tout en réduisant au maximum l'effort d'échantillonnage. À la taille d'échantillon recommandée et en présence de populations de faible densité, cette méthode a permis la détection d'environ 80 % des infestations et de 2,7 fois plus d'arbres infestés que la méthode consistant à échantillonner le quart de la circonférence du tronc à hauteur de poitrine. Elle permet de déceler les arbres infestés avant l'apparition des premiers signes ou symptômes. De plus, elle est moins destructive pour les arbres que l'enlèvement de parcelles d'écorce sur la tige principale et peut être intégrée à un programme d'assainissement ou d'entretien régulier des arbres appartenant à la ville. Du fait qu'elle permet de déceler les arbres infestés asymptomatiques, cette méthode donne plus de temps aux gestionnaires pour élaborer et mettre en place des stratégies de lutte contre ce ravageur exotique que les autres méthodes comme les inspections visuelles et l'enlèvement de parcelles d'écorce sur le tronc des arbres.

MODELLING TRADE-ASSOCIATED PATHWAYS OF ALIEN FOREST INSECTS ESTABLISHMENTS IN CANADA

Denys Yemshanov[1], Frank Koch[2], Mark Ducey[3], and Klaus Kohler[4]

[1] *Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre*
1219 Queen Street East
Sault Ste. Marie, ON P6A 2E5

[2] *Department of Forestry and Environmental Resources, North Carolina State University*
USDA Forest Service Eastern Forest Environmental Threat Assessment Center
3041 Cornwallis Road
Research Triangle Park, NC 27709, USA

[3] *University of New Hampshire, Department of Natural Resources and the Environment*
Durham, NH 03824, USA

[4] *Canadian Food Inspection Agency*
59 Camelot Drive
Ottawa, ON K1A 0Y9

Abstract

Recent developments in plant biosecurity have identified an ongoing paradigm shift from border-centered programs to policies that trace complete pathways of new invasive species' introductions. To better understand this vexing issue, a new class of decision support tools is required, that could look beyond the biological spread and estimate the likelihoods of introductions of new invasive organisms caused by human activities (such as trade and transportation). There is also an apparent need of quick-response decision support tools that would be capable of doing rapid pathway assessments for emerging invasive pests and hence supporting pest risk assessments and time-critical regulatory decisions. We present a novel methodology to characterize and predict pathways of human-assisted establishment of alien forest insects. We have developed a stochastic quantitative model of how these species may be moved with commodity flow through a network of international marine ports and major transportation corridors in Canada. The study makes use of a Canadian roadside survey database and statistical data on Canadian marine imports, complemented with geo-referenced information on ports of entry, populated places and empirical observations of historical spread rates for invasive pests. The model is formulated as a Markovian pathway matrix, and allows for quantitative characterization of location-specific likelihoods and vectors of new pest

introductions in North America. The model offers the potential to analyze pathways from both existing and anticipated infestations, and is designed to work with a wide range of transportation and commodity movement data.

We applied the pathway model to estimate rates of human-assisted establishment of alien forest insects at urban and rural settlements across Canada, as well as cross-border transport to locations in the U.S. Our results suggest a very low nationwide establishment rate for Canada relative to the U.S. (0.034 new forest insect species per year vs. 1.89). Among Canadian urban areas, Greater Toronto and Greater Vancouver appear to have the highest alien forest insect establishment potential; however, the estimated rates for these areas are nine and 95 times lower, respectively, than the average establishment rates for the five largest U.S. urban areas.

Résumé

L'évolution récente dans le domaine de la biosécurité végétale a permis de mettre en lumière un changement radical dans les programmes nationaux qui se tournent de plus en plus vers des politiques qui suivent à la trace les voies d'introduction de nouvelles espèces envahissantes. Pour mieux comprendre cet épineux problème, il faut disposer d'une nouvelle classe d'outils d'aide à la décision, des outils qui peuvent non seulement examiner la propagation sur le plan biologique, mais également estimer les possibilités d'introduction de nouveaux organismes envahissants dues à des activités humaines (comme les échanges commerciaux et le transport). Il est aussi manifeste qu'il faut se doter d'outils d'aide à la décision et d'intervention rapide qui permettraient d'évaluer rapidement les voies d'introduction de nouveaux organismes nuisibles envahissants et d'ainsi appuyer les évaluations du risque phytosanitaire et la prise de décisions réglementaires déterminantes. Nous présentons une nouvelle méthodologie pour caractériser et prévoir les voies anthropiques d'introduction et d'établissement d'insectes forestiers étrangers. Nous avons développé un modèle quantitatif stochastique de la façon dont ces espèces peuvent se déplacer à la faveur du mouvement des marchandises dans un réseau de ports maritimes internationaux et de couloirs majeurs de transport du Canada. L'étude tire parti d'une base de données d'enquête routière canadienne et de données statistiques sur les importations maritimes canadiennes, que viennent compléter des données géospatiales sur les ports d'entrée, les lieux peuplés et des observations empiriques sur les rythmes historiques de propagation d'organismes nuisibles envahissants. Le modèle prend la forme d'une matrice markovienne de cheminement et permet de quantifier les probabilités propres au lieu et les voies d'introduction

de nouveaux organismes nuisibles en Amérique du Nord. Il permet d'analyser les voies d'introduction depuis des foyers d'infestation existants ou prévus et est conçu pour pouvoir être utilisé avec un large éventail de moyens de transport et de données sur le mouvement des marchandises.

Nous avons utilisé le modèle de cheminement pour estimer les taux d'établissement d'insectes forestiers étrangers dans les zones urbaines et rurales du Canada sous l'effet d'activités humaines, ainsi que le transport transfrontalier vers des emplacements situés aux États-Unis. D'après les résultats que nous avons obtenus, le taux annuel d'établissement de nouvelles espèces d'insectes forestiers à l'échelle nationale est très faible au Canada comparativement aux États-Unis (0,034 en comparaison de 1,89). Les grandes régions métropolitaines de Toronto et de Vancouver sont parmi les zones urbaines du Canada qui semblent présenter le potentiel le plus élevé d'établissement d'insectes forestiers étrangers, mais les taux estimés d'établissement dans ces régions sont respectivement 9 et 95 fois plus faibles que les taux d'établissement moyens dans les cinq plus importantes agglomérations urbaines des États-Unis.

EMERALD ASH BORER (*AGRILUS PLANIPENNIS*) AND THE BROWN SPRUCE LONGHORN BEETLE (*TETROPIUM FUSCUM*): AN INNOVATIVE BIOCONTROL METHOD USING AUTOCONTAMINATION WITH THE ENTOMOPATHOGENIC FUNGUS *BEAUVERIA BASSIANA*

Robert Lavallée[1], Barry Lyons[2], Jon. Sweeney, [3]Martine Blais[1], Claude Guertin[4], George Kyei Poku[2], and Kees van Frankenhuyzen[2]

[1] *Natural Resources Canada, Canadian Forest Service, Laurentian Forestry Centre*
1055 du P.E.P.S.
P.O. Box 10380, Stn. Sainte-Foy
Québec, QC G1V 4C7

[2] *Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre*
1219 Queen Street East
Sault Ste. Marie, ON P6A 2E5

[3] *Natural Resources Canada, Canadian Forest Service, Atlantic Forestry Centre*
1350 Regent Street
P.O. Box 4000
Fredericton, NB E3B 5P7

[4] *Institut national de la recherche scientifique, INRS-Institut Armand-Frappier*
531, boulevard des Prairies
Laval, QC H7V 1B7

Abstract

In a new habitat, some exotic insects can take an initial advantage over the limited number of regulating biotic factors. Even if some entomopathogen fungi were present in established populations of the emerald ash borer (EAB) (Ontario and Québec) and of the brown spruce longhorn beetle (BSLB) (Nova Scotia), they may not be able to regulate high insect populations because these pathogens are population density dependant. In order to try to overcome this limitation, we investigated the assumption that, under endemic conditions, the enhancement of entomopathogenic fungus in the insect populations could help to limit or to slow down their spread. The first goal of this research was to develop a new strategy to enhance the horizontal transmission of the disease caused by the entomopathogenic fungi in the populations of these two recently introduced exotic insects. The second objective was to assess if insect traps, typically used in detection programs, could be modified and adapted to allow fungal

autocontamination of both EAB and BSLB adults. These experiments were conducted under controlled field or laboratory conditions. Based on the preliminary successful results we obtained, new very promising prospects can be considered to target populations of other exotic pest species in recently infested areas using a similar approach.

Résumé

Les facteurs de contrôle naturel peuvent être limités dans l'environnement d'un nouvel insecte exotique envahisseur. Des champignons entomopathogènes ont été retrouvés dans les populations de l'agrile du frêne (AF) (Ontario and Québec) et du longicorne brun de l'épinette (LBE) (Nouvelle Écosse). La dispersion de ces champignons peut être limitée par le fait qu'elle est aussi reliée à la densité de l'insecte. En condition endémiques des populations d'insectes cibles, nous voulons démontrer que qu'il est possible de favoriser une augmentation de l'incidence des champignons entomopathogènes. Notre premier but sera de développer une stratégie pour favoriser la dispersion horizontale du pathogène parmi les deux populations d'insectes exotiques. Notre deuxième objectif est de démontrer si des pièges utilisés pour faire de la détection d'insectes peuvent être adaptés pour favoriser l'autocontamination chez des adultes de l'AF et du LBE. Ces tests on été réalisés en conditions de terrain ou de laboratoire. Les résultats des premiers essais sont présentés.

BSLB: Update on Survey, Population Ecology, Impact, and Management

J. Sweeney[1], P. Silk[1], L. Flaherty[1,2], K. Porter[1], W. MacKinnon[1], and D. Pureswaran[3]

[1] Natural Resources Canada, Canadian Forest Service, Atlantic Forestry Centre
1350 Regent Street
P.O. Box 4000
Fredericton, NB E3B 5P7

[2] University of New Brunswick
Fredericton, NB

[3] Natural Resources Canada, Canadian Forest Service, Laurentian Forestry Centre
1055 du P.E.P.S.
P.O. Box 10380, Stn. Sainte-Foy
Québec, QC G1V 4C7

Abstract

In its native Europe, the brown spruce longhorn beetle, *Tetropium fuscum* (F.) (Coleoptera: Cerambycidae) (BSLB) primarily colonizes stressed or weakened Norway spruce, *Picea abies* (L.) Karst, and is not considered a primary pest. In Canada, the BSLB often infests red spruce trees, *Picea rubens* Sarg., with full, green, apparently healthy crowns and the trees respond with resin flow down the main stem. The BSLB has been classified as a quarantine pest since 2000. The quarantine zone was expanded in spring of 2007 to include all known sites positive for BSLB based on trapping surveys using host volatile-baited traps. Also in 2007, trap sensitivity at detecting BSLB was significantly increased by the addition of fuscumol (the BSLB's aggregation pheromone) to host volatile-baited traps, resulting in new BSLB detections at 17 sites beyond the boundaries of the recently expanded containment area. By the end of the 2010 trapping survey, BSLB had been detected at a cumulative total of 59 sites outside of the current containment area as established in May 2007; the Canadian Food Inspection Agency (CFIA) has designated a 1 km radius prohibition of movement zone at each of these 59 sites.

The mechanisms allowing *T. fuscum* to colonize healthier trees in Canada than is observed in Europe is unknown, but it may be related to colonization of a novel host, i.e., red spruce (a bottom-up factor) and/or its new natural enemy complex (top-down factor). As part of her PhD research, Leah Flaherty has been investigating the relative effects of these top-down and bottom-up factors on BSLB performance in Canada using manipulative field experiments. Results from

experiments in which mating pairs were caged on healthy vs. stressed (girdled) vs. felled spruce and either exposed to- or protected from natural enemies, suggest that the impact of natural enemies largely depends on the condition of the host tree. Performance (i.e., apparent survival) is higher on stressed red spruce trees than on healthy trees when BSLB is protected from natural enemies, but there is increased woodpecker predation and parasitism by the native parasitoids, *Rhimphoctona macrocephala* (Provancher) and *Wroughtonia occidentalis* (Cresson) on stressed trees when unprotected. Although BSLB adults were larger and parasitism was lower on healthy than on stressed red spruce trees, development time was extended, reducing fitness. Experiments evaluating the effect of tree species (red vs. Norway) and the time of oviposition are ongoing.

Kevin Porter and Wayne MacKinnon have established a series of permanent sample plots to estimate the impact of BSLB on spruce at "ground zero" near Halifax, where the beetle has been established for >20 years, as well as at sites along a transect that runs > 100 km distant from Halifax, where often the only evidence of BSLB is the capture of one or two adults in a pheromone-baited trap. Results to date indicate that signs of infested trees are almost nonexistent at distant sites where only 1-2 adult BSLB have been trapped, but that impact is significant at sites where the BSLB has long been established. A total of 62 fixed radius plots (11.5 m radius) were established in 2008 at random locations within three sites near Halifax, where BSLB has been established for > 20 years. All spruce trees in these plots were surveyed for signs of BSLB infestation (unexplained resin flow down the stem, *Tetropium* spp. exit holes) and health (live, recently dead, dead > 1 year). MacKinnon and Porter found an average of 25% and 29% of spruce basal area either infested or killed by BSLB in 2008 and 2009, respectively (range: 0-100% in individual plots in both years); trees dead for > 1 year were not included in those estimates. By felling and rearing adults from a subsample of trees, they also confirmed the positive association of light, moderate and heavy unexplained resin flow with increasing levels of BSLB infestation and density of emerging adults.

Although the beetle is under regulatory control by CFIA, direct control methods are needed to suppress populations in outlier populations and to slow spread along the leading edge. We have been testing two pheromone-based methods of population suppression since 2008: 1) mass trapping; and 2) broadcast application of pheromone for mating disruption.

Black panel intercept traps baited with synthetic aggregation pheromone (fuscumol) and host

volatiles have been used successfully in BSLB surveys since 2007. Because these traps capture both male and female BSLB, mass trapping offers a potential means of suppressing the population of egg laying females at targeted sites. To test this, high densities (100 per ha) of traps baited with synthetic fuscumol and host volatiles were set out in a 10 m x 10 m grid and replicated in four 1 ha plots in each year (2008 and 2009). Each mass trapping plot was paired with a 1 ha untreated plot located 200-100 m away. Three decks of spruce bait logs were set out in each treated and control plot along a diagonal transect. Data from 2008 and 2009 were pooled (n=8) and 1-tailed paired t-tests used to test whether infestation was lower in treated plots than control plots. The percentage of spruce bait logs infested with *T. fuscum* and the mean density larvae per m^2 were significantly lower in mass-trapped plots than untreated control plots. 2010 trials will test the efficacy of fewer traps per ha (e.g. 25 traps per ha on a 20 x 20 m spacing) and methods of increase trapping efficacy (e.g., fluon).

To test the efficacy of suppressing BSLB via pheromone-mediated mating disruption, fuscumol was formulated at 10% concentration in Hercon flakes and applied twice per season (at the onset and peak of adult emergence) at a rate of 2.75 kg/ha. In 2008, pvc flakes were applied from the ground in 2008 using modified leaf blowers; in 2009 and 2010, Hercon Bioflakes® were aerially applied from a hopper suspended beneath a helicopter. Plots were 4 ha in size and were replicated twice in 2008 and four times in each of 2009 and 2010; equal numbers of untreated plots served as controls. Response variables were: 1) percentage of female *T. fuscum* mated (2009 plots only); 2) mean percentage of spruce bait logs infested in each year; 3) mean density of *T. fuscum* larvae in bait logs; and 4) mean numbers of *T. fuscum* captured per trap baited with pheromone plus host volatiles. Data were pooled from 2008 and 2009 and 1-tailed t-tests used to test if mating success or infestation was lower in treated than control plots. Broadcast application of fuscumol-impregnated Hercon flakes significantly reduced: 1) the percentage of *T. fuscum* females that were mated; 2) the percentage of bait logs infested with *T. fuscum*; and 3) the density of *T. fuscum* larvae per m^2 in bait logs, but did not reduce the mean numbers of *T. fuscum* captured in pheromone-baited traps. Results from 2010 trials were not known at the time of the 2010 Pest Forum. Additional trials are planned for 2011.

PUTTING THE NFPS ON THE GROUND: ECOLOGICAL RISK ASSESSMENT FOR EMERALD ASH BORER

***David Kreutzweiser*[1], *Steve Holmes*[1], *Lisa Venier*[1], *Krista Ryall*[1], *Isabelle Aubin*[1], *Dean Thompson*[1], *and Taylor Scarr*[2]**

[1] *Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre*
1219 Queen Street East
Sault Ste. Marie, ON P6A 2E5

[2] *Ontario Ministry of Natural Resources, Forest Health and Silviculture*
70 Foster Drive, Suite 400
Sault Ste. Marie, ON P6A 6V5

Abstract

Canada's National Forest Pest Strategy includes a Risk Analysis Framework that requires science-based risk assessments for mitigation of emerging forest pest threats, including assessments of the extent to which forest pests threaten forest ecosystem integrity. The invasive insect, emerald ash borer (EAB), is rapidly spreading through southern Ontario and causing extensive mortality of ash trees. Many of these trees are in residual forest fragments or riparian (shoreline) buffers that provide critical refuge habitats, movement corridors, and ecological services including the support of a rich biodiversity and the protection of water quality and aquatic ecosystem health. We recently initiated a large-scale, integrated field study to determine the environmental and biodiversity implications of ash mortality from EAB in ecologically-sensitive areas including ravine forests, woodlots, and wetlands. Our project will directly increase the ecological risk assessment capacity for an invasive forest insect pest such as EAB, by quantifying ecosystem susceptibilities, environmental consequences, and potential pest management strategies. Results will provide a measure of the environmental costs of an invasive forest insect pest.

Résumé

Un cadre d'évaluation des risques est intégré à la Stratégie nationale de lutte contre les ravageurs forestiers du Canada et exige la réalisation d'évaluations scientifiques des risques liés aux mesures d'atténuation des menaces posées par de nouveaux ravageurs forestiers, y compris une évaluation de la mesure à laquelle les ravageurs forestiers menacent l'intégrité des écosystèmes

forestiers. L'agrile du frêne, une espèce exotique envahissante, se propage rapidement dans le sud de l'Ontario et y cause une mortalité importante des frênes. Bon nombre de ces arbres sont présents dans les vestiges de forêt résiduelle et dans des zones riveraines (en bordure de plans d'eau) qui fournissent des refuges essentiels à la faune et des couloirs de déplacement et remplissent des fonctions écologiques, y compris le maintien d'une riche biodiversité et la protection de la qualité de l'eau et de la santé des écosystèmes aquatiques. Nous avons récemment entrepris sur le terrain une étude intégrée à grande échelle pour déterminer les répercussions sur l'environnement et la biodiversité de la mortalité des frênes due à l'agrile du frêne dans les zones écosensibles, y compris les forêts de ravins, les boisés et les milieux humides. Notre projet permettra de quantifier la sensibilité des écosystèmes, les répercussions environnementales et les stratégies antiparasitaires potentielles, contribuant ainsi directement à accroître la capacité d'évaluation des risques écologiques posés par un insecte forestier envahissant comme l'agrile du frêne. Les résultats obtenus donneront un aperçu des coûts pour l'environnement occasionnés par un insecte forestier ravageur envahissant.

SESSION XI: THE TRIA PROJECT: GENOMICS OF THE MOUNTAIN PINE BEETLE SYSTEM

Chair: ***Richard Hamelin***
Natural Resources Canada, Canadian Forest Service

SEANCE XI : LE PROJET TRIA : GENOMIQUE DU DENDROCTONE DU PIN PONDEROSA

Président : ***Richard Hamelin***
Ressources naturelles Canada, Service canadien des forêts

A Short Introduction to Genomics

Anne-Christine Bonfils

Natural Resources Canada, Canadian Forest Service
Ottawa, ON K1A 0E4

National Research Council of Canada (2008-2011)
Ottawa, ON K1A 0R6

Abstract

A genome is the entire genetic information of an organism and genomics is the study of genomes. At first, genomics was centered on reading nucleotide sequences and identifying genes to understand what they controlled. The field of genomics has changed so much from these early days that experts now refer to the "post-genomics era" involving spectacular scientific advancement. The power of genomics-based integrative approaches lies in the ability they provide to study biological systems in their entirety and to compare species. This helps scientists understand how genes and their products interact in a given environment and how genetic variations affect traits such as adaptation, productivity, quality, or disease resistance. While genetic mechanisms are not yet fully understood in their complexity, genomics is rapidly evolving from an information science to a science that offers many concrete applications. This presentation introduces the field genomics, its utility in forestry, and the forest genomics research projects supported by the government of Canada.

Résumé

Le génome est constitué de toute l'information génétique d'un organisme et la génomique est l'étude des génomes. La génomique a d'abord été centrée sur la lecture de séquences de nucléotides et sur l'identification de gènes pour comprendre ce qu'ils contrôlaient. Le domaine de la génomique a tellement changé depuis ses débuts que les experts parlent maintenant d'« ère post-génomique » impliquant de spectaculaires avancées scientifiques. La puissance des approches intégrées basées sur la génomique réside dans la possibilité qu'elles offrent d'étudier des systèmes biologiques dans leur totalité, et de comparer les espèces entre elles. Ainsi, les chercheurs peuvent comprendre comment les gènes et leurs produits interagissent dans un environnement donné et comment les variations génétiques influencent des facteurs tels que l'adaptation, la productivité, la qualité, ou la résistance aux maladies. Bien que les mécanismes

génétiques ne soient pas encore élucidés dans toute leur complexité, la génomique évolue rapidement d'une science d'information à une science porteuse de nombreuses applications concrètes. Cette présentation donne un aperçu de la génomique, de son utilité en foresterie et des projets de recherche en génomique forestière soutenus par le gouvernement du Canada.

THE TRIA PROJECT: GENOMICS OF THE MOUNTAIN PINE BEETLE COMPLEX

Richard Hamelin for Joerg Bohlmann

University of British Columbia

NOT AVAILABLE

Role of Drought in Mediating Mountain Pine Beetle–Tree Interactions: Putting Theory into Practice

Nadir Erbilgin[1], Inka Lusebrink[2], and Maya Evenden[2]

[1] *Department of Renewable Resources, University of Alberta*
230A Earth Sciences
Edmonton, AB T6G 2E3

[2] *Department of Biological Sciences, University of Alberta*
2-14A Earth Sciences
Edmonton, AB T6G 2E3

Abstract

The mountain pine beetle (MPB) is a major pest of North American forests. Intermittent outbreaks have historically occurred, but warming conditions have allowed the current eruption to expand beyond the beetle's historic range. It has recently begun killing lodgepole and hybrid lodgepole-jack pines in Alberta. The extent to which this pest will establish in jack pine, and whether it will expand into eastern forests are unknown. We are investigating one component of MPB invasion, how drought affects tree defenses against MPB. We focused on three pine species and found some variations in their defenses against MPB. These investigations will provide an improved understanding of the biological functions of MPB with their host trees and environment and help clarify the constraints on and opportunities for beetle adaptations to new environments, and the influence of host trees on these processes. The resulting outcome will be useful for the development of effective, sustainable and environmentally friendly pest management strategies. Further, this work will help us understand factors contributing to host and range expansion of forest insects, a phenomenon that is becoming increasingly prevalent with altered climate.

Résumé

Le dendroctone du pin ponderosa (DPP) est un insecte ravageur important des forêts de l'Amérique du Nord, où il a pullulé périodiquement dans le passé. Toutefois, sous l'effet du réchauffement du climat, l'actuelle infestation a pu se propager au delà de l'aire de répartition historique du ravageur. Le dendroctone a récemment commencé à détruire des pins tordus latifoliés, des hybrides du pin tordu latifolié et des pins gris en Alberta. Nous ne savons pas dans quelle mesure le ravageur adoptera le pin gris et s'il colonisera les forêts de l'Est. Nous étudions

un aspect lié à la progression du DPP, soit les effets de la sécheresse sur les mécanismes de défense de l'arbre contre le ravageur. Nous nous sommes intéressés à trois essences de pin et nous avons constaté que leurs mécanismes de défense contre le DPP présentaient certaines variations. Ces recherches aideront à mieux comprendre les fonctions biologiques du DPP en regard des arbres-hôtes et de l'environnement ainsi qu'à clarifier les facteurs limitatifs et les possibilités d'adaptation du dendroctone à de nouveaux milieux et l'influence des arbres-hôtes sur ces processus. Les résultats ainsi obtenus seront utiles à l'élaboration de stratégies antiparasitaires efficaces, durables et sans danger pour l'environnement. De plus, ces travaux nous aideront à comprendre les facteurs contribuant à l'élargissement de la gamme d'hôtes et de l'aire de répartition des insectes forestiers, un phénomène qui devient de plus en plus courant avec le réchauffement du climat

Recent Advances in Bark Beetle Genomics

Christopher I. Keeling[1], Hannah Henderson[1], Maria Li[1], Harpreet K. Dullat[1], Mack Yuen[1], Jordie Fraser[2], Tiffany Clarke[2], Dezene P. W. Huber[2], Steven J. Jones[3], and Jörg Bohlmann[1]

[1] University of British Columbia
2125 East Mall
Vancouver, BC V6T 1Z4

[2] University of Northern British Columbia
3333 University Way
Prince George, BC V2N 4Z9

[3] Canada's Michael Smith Genome Sciences Centre
Vancouver, BC

Abstract

Until recently, our understanding of the mountain pine beetle (MPB, *Dendroctonus ponderosae*) has been limited by the lack of sequence information. However, within the Tria Project (www.thetriaproject.ca) we have created extensive transcriptome and genome sequence resources for the MPB that have allowed us to begin to examine the various processes of host colonization at the molecular level. In addition, we have obtained transcriptomic and proteomic data of specific tissues to guide the identification and functional characterization of genes involved in the processes of olfaction, pheromone biosynthesis, cold tolerance, and host defence detoxification, and our progress to date will be described.

Résumé

Jusqu'à tout récemment, nos connaissances sur le dendroctone du pin ponderosa (DPP, *Dendroctonus ponderosae*) étaient limitées en raison du manque de données sur les séquences. Le projet Tria, un projet de génomique intégrée pour lutter contre le DPP (www.thetriaproject.ca), nous a toutefois permis d'acquérir des ressources considérables sur les séquences du transcriptome et du génome, ressources grâce auxquelles nous avons pu commencer à examiner les divers processus de colonisation de l'hôte au niveau moléculaire. De plus, nous avons obtenu des données sur le transcriptome et le protéome de tissus spécifiques afin de guider l'identification et la caractérisation fonctionnelle des gènes intervenant dans les processus d'olfaction, de biosynthèse phéromonale, de tolérance au froid et de détoxification des défenses de l'hôte. Nous décrirons les progrès accomplis à ce jour.

GENOMICS OF FUNGAL ASSOCIATES OF THE MOUNTAIN PINE BEETLE

Richard C. Hamelin[1], Colette Breuil[2], and the Tria Fungal Team

[1] Natural Resources Canada, Canadian Forest Service, Laurentian Forestry Centre
1055 du P.E.P.S.
P.O. Box 10380, Stn. Sainte-Foy
Québec, QC G1V 4C7

[2] University of British Columbia, Faculty of Forestry, Wood Science Forest Sciences Centre
4036–2424 Main Mall
Vancouver, BC V6T 1Z4

Abstract

Fungi play an important role in the Mountain Pine Beetle (MPB) life cycle. The association between bark beetles and vectored fungi appears to be symbiotic. The fungi benefit because beetles carry them through the tree bark to a nutrient-rich wood environment. The benefits to the beetle and its progeny are believed to include making nutrients available, detoxifying host defense metabolites, and weakening tree defenses. We are conducting genomics investigations on several fungal associates of the MPB to address these questions. We have sequenced the genome of *Grosmannia clavigera*, a fungal associate that is pathogenic to pine. This has allowed us to search the fungal genomes for genes that are putatively important in host infection and potentially in epidemics. In addition, we have discovered highly polymorphic markers that are used in population studies to determine population structure of these fungal associates. These studies will provide a better understanding of the population parameters in the fungal associates of the MPB and will feed genetic landscape maps of the trees, beetles and fungi to improve epidemic modeling capacity.

Résumé

Les champignons jouent un rôle important dans le cycle vital du dendroctone du pin ponderosa (DPP). L'association entre le dendroctone et les champignons qu'il transporte semble de nature symbiotique. Le DPP permet aux champignons de traverser l'écorce et d'accéder ainsi à un environnement ligneux riche en éléments nutritifs. On croit que les champignons rendent les éléments nutritifs accessibles aux dendroctones et à leur descendance, détoxifient les métabolites intervenant dans la défense de l'hôte et affaiblissent les mécanismes de défense de

l'hôte. Nous étudions le génome de plusieurs espèces de champignons associées au DPP afin de mieux comprendre ces relations. Nous avons séquencé le génome du *Grosmannia clavigera*, un associé fongique pathogène pour le pin, ce qui nous a permis de rechercher les gènes qui semblent jouer un rôle important dans l'infection des pins et, potentiellement, dans le déclenchement des infestations. Nous avons également découvert des marqueurs hautement polymorphes qui sont utilisés dans les études démographiques pour déterminer la structure des populations de ces associés fongiques. Ces travaux nous éclaireront sur les paramètres des populations des associés fongiques du DPP et nous permettront d'établir des cartes du paysage génétique des arbres, des dendroctones et des champignons et ainsi d'accroître notre capacité de modélisation des infestations.

Landscape-Scale Genomic Interactions Among Pine, Fungi, and Mountain Pine Beetle in Western Canada

Patrick James[1], David Coltman[1], Brent Murray[2], Richard Hamelin[3], and Felix Sperling[1]

[1] Department of Biological Sciences, University of Alberta
Edmonton, AB T6G 2E9

[2] Department of Ecosystem Science and Management, University of Northern British Columbia
Prince George, BC V2N 4Z9

[3] Department of Forest Sciences, University of British Columbia
Vancouver, BC V6T 1Z4

Abstract

The mountain pine beetle outbreak in western Canada is the result of interactions among a beetle, host pine trees, associated pathogenic fungi, climate, and spatial context. It is important to evaluate how animal and fungal movement, gene flow, and spatial genetic structure are influenced by spatial heterogeneity, each other, and host pine trees, in order to better understand these complex relationships and inform management practices. Using a landscape genetics approach, we examined genetic differentiation within each species involved in the outbreak system as a function of spatial landscape features and the neutral genetic structure of associated species.

Résumé

L'infestation de dendroctone du pin ponderosa qui sévit actuellement en Colombie-Britannique est le résultat de nombreuses interactions entre un coléoptère, les pins qui lui servent d'hôte, plusieurs espèces de champignons pathogènes associées, le climat et le contexte spatial. Il est important d'évaluer comment les déplacements du dendroctone et de ses associés fongiques, le flux génétique et la structure génétique spatiale sont dépendants de l'hétérogénéité spatiale, des interactions entre chacune de ces composantes et des pins hôtes pour mieux comprendre ces relations complexes et orienter en conséquence les pratiques de gestion. En utilisant une approche de génétique du paysage, nous avons examiné le niveau de différenciation génétique au sein de chaque espèce incriminée dans ce système d'infestation en tant que fonction des caractéristiques spatiales du paysage et de la structure génétique neutre des espèces associées.

CAN GENOMICS FEED EPIDEMIC MODELING AND PREDICTIONS?

Barry Cooke

Natural Resources Canada, Canadian Forest Service, Northern Forestry Centre
5320–122nd Street
Edmonton, AB T6H 3S5

NOT AVAILABLE

A New Canadian Forest Service State-of-the-Art Insect Rearing and Quarantine Facility

Peter Ebling

Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre
1219 Queen Street East
Sault Ste. Marie, ON P6A 2E5

Abstract

The Canadian Forest Service has recently attained funding for the construction of a state-of-the-art facility to produce and study invasive forest insect species, while maintaining a core capacity to produce domestic pests.

A 17135 ft² facility is currently under construction, bringing together all insect production and quarantine services. The facility is divided into four zones having different functions and design elements, including 1) a Domestic Species Zone for establishing/maintaining colonies of disease-free domestic insects and for developing/manufacturing artificial diets, 2) an Invasive Species Zone (i.e., quarantine facility) for maintaining colonies of invasive insects and for conducting a wide variety of research activities, 3) a unique Variable Utilization Area, which can be converted between domestic or invasive, and 4) Offices and other support areas.

Laboratory spaces are constructed following Canadian Food Inspection Agency (Biohazard Containment and Safety Branch) PPC-Level 2 facility requirements. "Clean-room" technology is employed, including HEPA-filtered supply and exhaust air, and adjustable air pressurization in each room to maintain various levels of positive or negative pressure for quarantine or domestic species needs. Our computerized building management systems allows for remote web-based controlling/monitoring of all environmental parameters and historical tracking for all work spaces.

Construction and commissioning of the facility will be completed by March 2011.

Résumé

Le Service canadien des forêts a récemment obtenu des fonds pour la construction d'une installation ultramoderne de production et d'étude d'espèces exotiques envahissantes d'insectes forestiers, qui continuera également à produire des espèces indigènes.

Une installation de 1 591 m² (17 135 pi²) est actuellement en construction et réunira sous un même toit tous les services de quarantaine et de production d'insectes. Elle est divisée en quatre zones à vocation et à composantes différentes soit 1) une zone pour les espèces indigènes servant à l'établissement et à l'entretien de colonies d'insectes exempts de maladies et à la mise au point et à la préparation de milieux nutritifs, 2) une zone pour les espèces envahissantes (c.-à-d., une installation de quarantaine) servant à l'entretien de colonies d'insectes envahissants et à la réalisation d'un large éventail d'activités de recherche, 3) une zone d'utilisation variable unique, qui peut être convertie pour servir aux espèces indigènes ou envahissantes, et 4) des bureaux et autres services de soutien.

Les laboratoires sont construits selon les exigences de niveau de confinement 2 pour les phytoravageurs (PPC-2) de l'Agence canadienne d'inspection des aliments (Bureau du confinement des biorisques et sécurité). La technologie de « salle blanche » y est utilisée, y compris l'arrivée et l'évacuation d'air par des filtres HEPA et la pression d'air ajustable dans chaque pièce permettant d'y maintenir divers niveaux de pression positive ou négative, selon les besoins des espèces indigènes ou justiciables de quarantaine. Nos systèmes informatisés de gestion de l'immeuble permettent de contrôler et de surveiller à distance par le Web tous les paramètres du milieu et de connaître l'historique des activités menées dans tous les espaces de travail.

La construction et la mise en service de l'installation seront terminées en mars 2011.

SESSION XII: REMOTE SENSING AND FOREST PEST MANAGEMENT

Chair: *Louis Morneau*

Ministère des Ressources naturelles et de la Faune du Québec

SEANCE XII : TELEDETECTION ET REPRESSION DES RAVAGEURS FORESTIERS

Président : *Louis Morneau*

Ministère des Ressources naturelles et de la Faune du Québec

Operational Remote Sensing Techniques Used for Monitoring Pest Defoliation and Mortality in Québec

Antoine Lebocuf [1], ***Louis Morneau*** [2], ***and Marie-Pierre Samson*** [1]

[1] *Ministère des Ressources naturelles et de la Faune du Québec*
Direction des inventaires forestiers
880, chemin Ste-Foy
Québec, QC G1X 2B2

[2] *Ministère des Ressources naturelles et de la Faune du Québec*
Direction de l'environnement et de la protection des forêts
2700, rue Einstein, local D.2.370a
Québec, QC G1P 3W8

Abstract

The ministère des Ressources naturelles et de la Faune du Québec is mandated to provide pest defoliation and mortality to report to public and through our forest inventory. We developed a multi scale approach using several remote sensing data in combination with aerial surveys. A first step of detection is realised with Modis images (250 meters of spatial resolution) using monitoring data from the previous year to identify zones of insect infestations. Within these zones, we delineate areas of defoliation and mortality with Landsat TM data. These contours and images aim to support aerial surveys. In highly infested areas, we tested the utility of new RapidEye images (5 meters of spatial resolution) with its five spectral bands (red, green, blue, red edge and infra-red). We found these images have a high potential to map infestation at a scale of 1:20,000. Finally, when it is possible, we link defoliation zones with aerial photography programs to reach a finer level of details. Layers are used to report defoliation and mortality for Québec and to update forest inventory maps in case of mortality.

Résumé

Le ministère des Ressources naturelles et de la Faune du Québec (MRNFQ) a la responsabilité de fournir aux fins de l'inventaire forestier des rapports sur la défoliation et la mortalité dues aux ravageurs et de rendre ces données publiques. Nous avons élaboré une approche multiéchelle s'appuyant sur des données de télédétection en combinaison avec des levés aériens. Une première étape de détection est réalisée au moyen d'images Modis (résolution spatiale de 250 m) utilisant des données de surveillance acquises l'année précédente afin de déterminer des zones

d'infestation par les insectes. À l'intérieur de ces zones, nous délimitons des secteurs de défoliation et de mortalité à l'aide de données Landsat TM. Ces limites et les images permettent d'appuyer les levés aériens. Dans les zones très infestées, nous avons éprouvé l'utilité de nouvelles images RapidEye (résolution spatiale de 5 m) avec leurs cinq bandes spectrales (rouge, vert, bleu, bordure rouge et infrarouge). Nous avons constaté que ces images offrent de grandes possibilités pour la cartographie des infestations à une échelle de 1/20 000. Enfin, lorsque c'est possible, nous lions les zones de défoliation à des programmes de photographie aérienne afin d'améliorer le niveau de détail. Les couches servent à faire état de la défoliation et de la mortalité de la forêt au Québec ainsi qu'à mettre à jour les cartes de l'inventaire forestier dans des cas de mortalité des arbres.

SATELLITE-DERIVED DISTURBANCE MAPPING IN ONTARIO: A MULTI-TEMPORAL OBJECT-BASED LANDSAT APPROACH

Ian Smyth

Ontario Ministry of Natural Resources, Science and Information Branch
Inventory, Monitoring and Assessment Section
300 Water Street
Peterborough, ON K9J 8M5

Abstract

The aim of creating a provincial disturbance map is to provide a consistent spatial inventory of natural and anthropogenic disturbances to meet regional and landscape level analysis needs (1:50,000 – 1:100,000). Disturbances to vegetation are constantly occurring, and the classification of medium resolution satellite imagery provides a cost effective and repeatable mechanism for mapping these changes.

This remote sensing approach involves segmenting and classifying vegetation change detection composites based upon 3 dates of Landsat Thematic Mapper (TM) imagery. An image differencing approach is used to isolate disturbances and associate them with broad time periods (pre-1990, 1990-2000 or post 2000). Through the use of various contextual data layers along with the interpretation of historical imagery, the type of disturbance events and the time period in which they occurred are further refined.

This presentation draws upon recent aerial survey campaigns undertaken in north-western Ontario to illustrate the benefits and limitations of applying this approach to mapping a range of disturbance types including cuts, burns, infrastructure, weather events and pest/disease.

Resume

L'objectif consiste à créer une carte provinciale des perturbations représentant un inventaire spatial cohérent des perturbations naturelles et anthropiques afin de répondre aux besoins d'analyse à l'échelle régionale et du paysage (1/50 000 – 1/100 000). Des perturbations de la végétation se produisent constamment et la classification des images satellites à moyenne

résolution offre un mécanisme économique et reproductible pour cartographier ces changements.

Cette approche basée sur la télédétection comprend la segmentation et la classification des images composites de détection des changements de la végétation selon trois dates d'acquisition par le Landsat TM (Thematic Mapper). Une approche de différenciation des images est utilisée pour déceler les perturbations et les associer à de grandes plages de temps (avant 1990, de 1990 à 2000 ou après 2000). L'utilisation de diverses couches de données contextuelles ainsi que l'interprétation d'images historiques permettent de préciser le type de perturbation et la période pendant laquelle elle s'est produite.

La présentation fait appel aux récents levés aériens effectués dans le nord-ouest de l'Ontario afin d'illustrer les avantages et les limites de l'application de cette méthode à la cartographie d'une gamme de perturbations, notamment des coupes, des brûlis, des infrastructures, des événements météorologiques et des infestations de ravageurs ou de maladies.

MAPPING ASPEN AND SPRUCE BUDWORM DEFOLIATION FROM OPTICAL FINE AND COARSE RESOLUTIONS AND RADAR SATELLITE IMAGERY

R.J. Hall[1a], S.J. Thomas[2b], J.J. Van der Sanden[2], R.S. Skakun[1], A. Deschamps[2], M. Filliatrault,[1] E. Arsenault[1], R. Landry[2], and L.E. White[2]

[1] Natural Resources Canada, Canadian Forest Service, Northern Forest Centre
5320–122nd Street Northwest
Edmonton, AB T6H 3S5

[2] Natural Resources Canada, Canadian Centre for Remote Sensing
588 Booth Street
Ottawa, ON K1A 0Y7

[a] E-mail: Ron.Hall@nrcan.gc.ca

[b] E-mail: Sylvia.Thomas@ccrs.nrcan.gc.ca

Abstract

National programs such as the National Forest Carbon Monitoring, Accounting and Reporting System and the National Forest Inventory require information about forest disturbances on an annual basis. In attempting to contribute to these information needs, Natural Resources Canada has been developing methods to map the severity of insect defoliation from fine and coarse resolution optical and radar satellite imagery. The concept of a National Defoliation Area Composite (NDAC) was presented at the 2009 National Forest Pest Management Forum. The NDAC involves the integration of provincial and territorial aerial surveys with multi-scale, remotely-sensed defoliation products from which annual products could be produced nationally. Because optical data is subject to data gaps from cloud cover and the timing from which to detect and map insect defoliation is often very narrow, an additional question being addressed is whether Canada's RADARSAT-2 satellite can be used in instances where optical data sources are not available.

To date, the focus in building the NDAC has been on developing remote sensing methods for fine and coarse resolution satellite data as applied to the detection and mapping of aspen and eastern spruce budworm defoliation. Methods for mapping aspen defoliation from Landsat data have

been developed and are being adapted for application to spruce budworm cumulative defoliation. Changes in radar backscatter appear to demonstrate potential for detecting aspen defoliation, and from this basis its empirical relationship with defoliation severity is being investigated. To fulfill the need for a coarse resolution sensor, pre- and post-defoliation images from MERIS, a medium spectral resolution imaging spectrometer on-board ENVISAT, are being evaluated for aspen and spruce budworm defoliation. Based on L2 data products from the European Space Agency, MERIS offers imagery with a 300m spatial resolution and a 575 km x 575 km footprint. These results will be combined with those generated from Landsat TM and SPOT satellite data. The objective of this presentation is to present recent progress from mapping aspen and spruce budworm defoliation, identify new sensor opportunities for mapping disturbances, and to highlight future work necessary in translating NDAC from concept to reality.

Résumé

Des programmes nationaux, tels que le Système national de surveillance, de comptabilisation et de production de rapports concernant le carbone des forêts ainsi que l'Inventaire forestier national, nécessitent chaque année de l'information sur les perturbations des forêts. Afin de répondre à ce besoin d'information, Ressources naturelles Canada a élaboré des méthodes pour cartographier la gravité de la défoliation par les insectes à partir d'images satellite radar et optiques à haute et basse résolution. Le concept d'images composites de la superficie de défoliation à l'échelle nationale (*National Defoliation Area Composite*, NDAC) a été présenté lors du Forum de 2009 sur la répression des ravageurs forestiers. Les NDAC comprennent l'intégration de levés aériens provinciaux et territoriaux avec des produits de télédétection sur la défoliation à plusieurs échelles, à partir desquels des produits peuvent être préparés annuellement à l'échelle nationale. Étant donné que les données optiques sont susceptibles de comporter des lacunes en raison de la couverture nuageuse et de la période souvent très restreinte pendant laquelle il est possible de détecter et de cartographier la défoliation par les insectes, on examine actuellement la possibilité d'utiliser le satellite canadien RADARSAT-2 lorsque les sources de données optiques ne sont pas disponibles.

Jusqu'à maintenant, les travaux d'élaboration des NDAC étaient axés sur la mise au point de méthodes de télédétection pour des données satellites à haute et basse résolution telles qu'appliquées à la détection et à la cartographie de la défoliation causée par la tordeuse des bourgeons de l'épinette et du dépérissement du peuplier faux-tremble. Des méthodes élaborées

pour la cartographie du dépérissement du peuplier faux-tremble à partir de données Landsat sont actuellement adaptées pour une application à la défoliation cumulative par la tordeuse des bourgeons de l'épinette. Les variations de la rétrodiffusion radar semblent prometteuses pour la détection du dépérissement du peuplier faux-tremble et, partant de cette base, sa relation empirique avec la gravité de la défoliation est présentement à l'étude. Afin de combler le besoin d'un capteur à faible résolution, des images acquises avant et après la défoliation par le spectromètre imageur MERIS à moyenne résolution spectrale, à bord du satellite ENVISAT, font l'objet d'une évaluation pour la défoliation due à la tordeuse des bourgeons de l'épinette et le dépérissement du peuplier faux-tremble. D'après les produits de données L2 de l'Agence spatiale européenne, MERIS offre une imagerie à résolution spatiale de 300 m et une zone de couverture de 575 km x 575 km. Ces résultats seront combinés avec ceux obtenus à l'aide des données satellites Landsat TM et SPOT. L'objectif de la présentation consiste à faire connaître les récents progrès de la cartographie sur la défoliation causée par la tordeuse des bourgeons de l'épinette et le dépérissement du peuplier faux-tremble, à déterminer les nouvelles possibilités qu'offrent les capteurs pour la cartographie des perturbations et à mettre en lumière les travaux qu'il faudra entreprendre pour faire passer les NDAC du concept à la réalité.

STATUS OF INSECTS, DISEASES, AND ABIOTIC EVENTS AFFECTING THE HEALTH OF P.E.I.'S FORESTS IN 2010

David Carmichael

P.E.I Department of Environment Energy and Forestry
J. Frank Gaudet Tree Nursery
183 Upton Road
P.O. Box 2000
Charlottetown, PEI C1A 7N8

Abstract

For the past decade, the Province of P.E.I. has not been involved in a great deal of consistent scouting and trapping of pests. A broad extension service does exist. This extension consists of identifying woody and herbaceous plant material, providing cultural information and identification of pests and abiotic issues associated with the Forest Industry, Horticultural Industry, the Ornamental Horticultural Industry and the General Public.

Commencing the fall of 2010, the Province of P.E.I. will begin to forecast and scout for a small number of predetermined pests. Significant resources for pest forecasting and surveying will not be put in place, however, the Province is committed to supporting the NFPS in a small way as indicated above.

The average annual rainfall for Charlottetown is 880mm. From January 1st to October 24th, 2010, the total accumulation to date was just over 670 mm., down from the 1200 mm in 2009. The growing season of 2010 was excellent growing season for many forms of plant material. Despite the reduction of rainfall to date as compared to 2009, rainfall was evenly distributed throughout the growing season with no drought conditions. Generally speaking, foliar diseases have increased in 2010 and insect pests were generally less significant.

INSECTS

Balsam Wooly Adelgid (*Adelges piceae*)

The Province of P.E.I. is divided up into 3 Counties, Kings, Queens and Prince, (East, Central and West respectively) Significant populations and damage can be found in spotty areas of Kings

County, moderate to significant spotty populations in Queens County and low populations exist in Prince County in 2010.

Spruce Bark Beetle (*Dendroctonus rufipennis*)

Populations have been found Island-wide, specifically in mature to over mature hedgerows, mature to over mature even aged stands and old field white spruce. Populations have lowered from 2009 to a low to moderate range in 2010.

Larch Bark Beetle (*Dendroctonus simplex*)

There had been a consistent moderate population affecting mature and over mature stands across the island for quite a number of years. Populations are in the low levels in 2010.

White Pine Weevil (*Pissodes strobi*)

Low to Moderate damage is found primarily on White Pine and Norway Spruce plantations throughout the island.

Japanese Beetle (*Popillia japonica*)

The CFIA had significant catches in the Community of Cornwall, specifically the Holiday Haven Campground, just west of Charlottetown in 2008. Low catches were found in the City of Charlottetown in 2008. A significant population continues to exist at the campground in 2010. Virginia creeper, pin cherry, chokecherry, beech, apple, hawthorn and mountain ash were species affected by Japanese beetle with Virginia creeper being the preferred species. There were no finds outside the area of the campground, though it is expected that a population continues to exist in the Municipality of Charlottetown and may have moved slightly outside the original 2008 boundaries.

Viburnum Leaf Beetle (*Pyrrhalta viburni*)

This pest affects Viburnums to varying degrees. Viburnums are all woody shrubs with many species. Specifically Wild Rasin, (*Viburnum cassinoidies*), Hobble bush, (*Viburnum alnifolia*) and Highbush Cranberry, (*Viburnum trilobum*) are our native species. Significant mortality to Highbush Cranberry has occurred after 3 to 4 years of significant infestations. In many regions of the Island, Viburnums have severely been affected by this pest as the population continues to rise

rapidly. Populations are considered to be significantly high in many areas of the Province in 2010; also, there continues to be more remote areas of the Province without populations in 2010.

European Gypsy Moth (*Lymantria dispar*)

The CFIA has continued to monitor outside the current regulated area, specifically the City of Charlottetown. Low egg mass presence and forecast in the fall of 2009 for this season. Nill to low foliar damage occurred in 2010.

Forest Tent Caterpillar (*Malacosoma disstria*)

Generally, there is a region within each of the Provinces three counties which have had significant populations in the past. No significant populations or defoliation in 2010 and forecasting with egg mass surveys will commence in the next month for the 2011 season.

Diseases

European Larch Canker (*Lachnellula willkommii*)

Currently the CFIA has a regulated region in the central Prince County area of the Province. The disease has not apparently spread to regions outside this regulated area.

Dutch Elm Disease (*Ophiostoma ulmi*)

This disease has been found in all regions of the Island with the exception of the North East Region of Kings County. The City of Summerside had a significant spike in mortality in 2008, not so significant in 2009 or 2010. The City of Charlottetown has had a significant spike in 2009 and again in 2010. The CFIA had recently declared the entire Province as infested with Dutch Elm Disease.

Dothiorella Wilt in Elm

The P.E.I. Department of Agriculture has a lab, which in recent years has been able to culture out potential DED samples. In doing so it was found that a small population of trees was positive for Dothiorella Wilt. The Province currently has no Regulations for Dutch Elm Disease or Dothiorella Wilt and it appears that Dothiorella wilt is of low presence.

White Pine Blister Rust (*Cronartium ribicola*)

Primarily a plantation density issue. Cultural practices of lifting or removing the lower whorls of branches, aids in keeping infections from advancing beyond low to moderate levels as currently exists.

Fire Blight (*Erwinia amylovora*)

There were low to moderate levels of fire blight on mountain ash in 2010, a reduction over the past two years.

Sirococcus on Red Pine and Colorado Spruce

A significant issue with a 50+ year old Crown Land Plantation of Red Pine in Camp Tamawabie, central Prince County. It is now believed that this pest is more widespread than initially thought. There are low to moderate amounts of Sirococcus affecting the ornamental Colorado blue spruce, low levels in white spruce and moderate levels in red pine in 2010.

Diplodia on Red and Austrian Pine

This pest, specifically on Austrian Pine, has been building significantly over the past few years and currently exists as a moderate to high pest issue, mainly with urban red and Austrian pines.

Typhrina on Red Maple

This pest was quite significant 3 and 4 years ago. In 2009, the significance had dropped to low levels. In 2010, the levels have elevated to the low to moderate range specifically in spotty regions throughout the Province.

Anthracnose on Sugar, Norway, Red and Silver Maple

A significant issue with moderate to high localized damage in 2008. Levels of infection have dropped to low levels in 2009. In 2010, levels specifically with Norway maple, have risen to moderate levels in spotty urban areas across the island. Anthracnose coexisted with the tars pot in 2010, though the tar spot was the pest of most significance

Tarspot on Norway Maple (*Rhytisma acerinum*)

Very significant foliar damage has occurred on Norway maple species and clones in 2010. This was the most significant pest on P.E.I. in 2010. Populations of this pest are definitely in the high to extreme levels in urban areas across the Island.

Rust on White Ash (*Puccinia sparganioides*)

Very significant issue on White Ash in spotty regions, though not consistently Island wide in 2010. Levels are in the moderate to high range in the areas with elevated infections.

Blossom Blight of Pin Cherry (*Monilinia fructicola*)

Significant issue in spotty areas of infection across the Island in 2010. Levels were in the moderate to high range in these areas.

Abiotic Issues

Significant roads salt damage can be found with many tree species, specifically Norway maple and clones, though other forms of maples as well as lindens, ash and oak are affected. The issue seems to be associated with our few main arteries.

SCIENCE AND TECHNOLOGY À LA CARTE

Chair: ***Matt Meade***
Canadian Institute of Forestry

SCIENCE ET TECHNOLOGIE À LA CARTE

Président : ***Matt Meade***
Institut forestier du Canada

Field Studies Agree and Extend Greenhouse Study Results of Host Resistance Trials of Douglas-fir to Armillaria Root Disease

Mike G. Cruickshank[1] and Barry Jaquish[2]

[1] *Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre*
Canadian Wood Fibre Centre
506 West Burnside Road
Victoria, BC V8Z 1M5

[2] *BC Ministry of Forests and Range, Research Branch*
3401 Reservoir Road
Vernon, BC V1B 2C7

Abstract

Selection for positive breeding traits for conifers mostly considers tree height growth as the dominant trait for early selection. More recently, tree breeders recognize the need to incorporate insect and disease resistance traits into selection programs. In this study, resistance to *Armillaria* root disease was evaluated in an Interior Douglas-fir nursery trial that consisted of seedlings of 70 select half-sib families from 4 seed planning zones in the BC Interior. Results showed families from drier subzones had higher seedling survival rates than families from cooler and wetter subzones; however, considerable variation existed among families. In the present study, five good and poor surviving families from one zone (West Kootenay Low-WKL) were used to determine whether the nursery screening results were valid under field conditions. A 22 year-old progeny test of WKL of the same families was used for comparison by inculcating fifteen trees within each family at the root collar with *Armillaria ostoyae* (Romagn.) Herink, and left for five years. The trees were subsequently excavated, lesions measured, and increment cores were taken at breast height from the infected trees and uninfected trees of the same family. Although the sample size was small, results showed that the most resistant families tended to be the slowest growing before infection. However, one family with lower resistance showed evidence of host tolerance, the ability to maintain growth under increasing damage caused by the pathogen. These results suggest that families respond differently to disease and breeding for *Armillaria* might consider including tolerance in programs of multi-trait index selection.

Résumé

La sélection pour des caractères positifs chez les conifères tient surtout compte de l'accroissement en hauteur comme caractère dominant initial de sélection. Plus récemment, les généticiens forestiers ont reconnu la nécessité d'intégrer aux programmes de sélection les caractères de résistance aux insectes et aux maladies. Dans le cadre de cette étude, la résistance au pourridié-agaric a été évaluée lors d'un essai en pépinière avec le douglas bleu à l'aide de semis de 70 descendances uniparentales provenant de quatre zones semencières de l'intérieur de la Colombie-Britannique. D'après les résultats obtenus, les semis des familles provenant de sous-zones plus sèches ont affiché des taux de survie plus élevés que ceux des familles provenant de sous-zones plus froides et plus humides; il existait cependant une variation inter-familles considérable. Dans le cadre de la présente étude, cinq familles à taux de survie inadéquat et adéquat provenant de la zone semencière WKL (West Kootenay Low) ont été utilisées pour déterminer si les résultats du criblage en pépinière étaient valables au champ. Un test de descendance de 22 ans de la zone semencière WKL portant sur les mêmes familles a été utilisé à des fins de comparaison, et 15 arbres de chaque famille ont été inoculés au niveau du collet par l'*Armillaria ostoyae* (Romagn.) Herink. Ces arbres sont demeurés sur le terrain pendant cinq ans, puis ont été extraits du sol pour mesurer les lésions qu'ils présentaient; des carottes ont été prélevées à hauteur de poitrine dans le tronc d'arbres infectés et non infectés de la même famille. Même si l'échantillon était réduit, les résultats montraient que les familles les plus résistantes avaient tendance à être celles ayant le taux de croissance le plus lent avant l'infection. Une famille moins résistante présentait cependant des signes de tolérance, la capacité de poursuivre sa croissance en dépit des dégâts grandissants du pathogène. Ces résultats semblent indiquer que les familles réagissent différemment à la maladie et qu'il faudrait envisager la possibilité d'inclure la tolérance à l'*Armillaria* dans les programmes de sélection combinée multi-caractères.

DROUGHT, ROOT DISEASES AND SECONDARY INSECTS

Robert Lavallée[1], Gaston Laflamme[1], Claude Guertin[2], and Gary Warren[3]

[1] *Natural Resources Canada, Canadian Forest Service, Laurentian Forestry Centre*
1055 du P.E.P.S.
P.O. Box 10380, Stn. Sainte-Foy
Québec, QC G1V 4C7

[2] *Institut national de la recherche scientifique*
INRS-Institut Armand-Frappier
531, boulevard des Prairies
Laval, QC H7V 1B7

[3] *Natural Resources Canada, Canadian Forest Service, Atlantic Forestry Centre*
Canadian Wood Fibre Centre
Corner Brook, NL A2H 6P9

Abstract

Climatic changes seem to increase the frequency of extreme climatic conditions like drought periods. Dendrochronology is a useful tool to link the incidence of abiotic stress with tree pests. We have applied this method of observation to red spruces (*Picea rubens*) infested by the spruce beetle (*Dendroctonus rufipennis*) in Nova Scotia. Increment cores collected at the base of trees under attack by these beetles showed growth reduction for the last 11 years. These reductions seem to be caused by *Armillaria* root diseases. Weather data showed that a severe drought occurred before the beginning of the growth decrease in 1997. When the increase of beetle population reached a peak, healthy spruces showing a normal growth began to be under attack by the beetle in 2009. This last event seems to show that spruce beetle is acting like a primary insect; but in fact, it is only a consequence of an epizooty of the beetle population following root diseases. The observation of the forest ecosystem over periods of several years helps to better understand the relationship between natural phenomenon appearing in a cascade of events during the long life of these trees, life that reaches often hundred years or more.

Résumé

Les changements climatiques semblent augmenter la fréquence de conditions météorologiques extrêmes comme des périodes de grandes sécheresses. La dendrochronologie est un outil très utile pour relier l'incidence des stress abiotiques aux ravageurs des arbres. Nous avons donc

appliqué cette méthode d'observation aux épinettes rouges (*Picea rubens*) attaquées par le dendroctone de l'épinette (*Dendroctonus rufipennis*) en Nouvelle-Écosse. Des carottes prélevées au bas des arbres attaqués par ces scolytes montrent des réductions de croissance pour les 11 dernières années. Ces réductions semblent possiblement causées par le pourridié agaric. Une vérification des données météorologiques montre qu'une sécheresse excessive a eu lieu juste avant le début de la décroissance en 1997. Dans le pic de l'augmentation de la population de dendroctones, des arbres sains montrant une croissance normale ont commencé à subir l'attaque des scolytes en 2009. Ce dernier événement peut porter à conclure que le dendroctone agit comme un insecte primaire; en réalité, ce n'est qu'une conséquence de l'épizootie du scolyte qui suit les maladies racinaires. L'observation de l'écosystème forestier sur des périodes de plusieurs années nous aide à mieux comprendre les interrelations entre des phénomènes naturels qui surviennent en cascade chez ces végétaux de longue vie et souvent centenaires.

MORTALITY SCHEDULE OF EMERALD ASH BORER ALONG A TEMPORAL GRADIENT OF INVASION IN THE URBAN FOREST

Chris J. K. MacQuarrie

Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre
1219 Queen Street East
Sault Ste. Marie, ON P6A 2E5

Abstract

Determining the relative effect of different mortality factors on the population dynamics of emerald ash borer (EAB) is necessary to aid management of this invasive pest. Three populations of EAB in Ontario that have been established for different time periods were sampled at regular intervals during the summer of 2010. A portion of these samples were placed into rearing while the remainder was destructively sampled to obtain the EAB larvae and adults. The survivorship of EAB exposed to mortality was then compared to the survivorship of individuals from the same sites that were reared.

Resumé

Il est nécessaire de déterminer l'effet relatif de différents facteurs de mortalité sur la dynamique des populations de l'agrile du frêne afin de pouvoir lutter contre cet insecte nuisible envahissant. Trois populations de l'agrile du frêne établies en Ontario à différentes périodes ont été échantillonnées à intervalles réguliers durant l'été 2010. Une partie des sujets prélevés a été placée sur milieu nutritif à des fins d'élevage tandis que le reste des échantillons a fait l'objet d'un échantillonnage destructif afin d'obtenir des larves et des adultes d'agrile du frêne. Le taux de survie des spécimens d'agrile du frêne exposés à la mortalité a ensuite été comparé à celui des individus provenant des mêmes sites qui ont été élevés sur milieu nutritif.

YIELD OPTIMIZATION OF THE ENTOMOPATHOGENIC FUNGUS *BEAUVERIA BASSIANA*

Narin Srei[1], Robert Lavallée[2], and Claude Guertin[1]

[1] *Institut national de la recherche scientifique*
INRS-Institut Armand Frappier
531, boulevard des Prairies
Laval, QC H7V 1B7

[2] *Natural Resources Canada, Canadian Forest Service, Laurentian Forestry Centre*
1055 du P.E.P.S.
P.O. Box 10380, Stn. Sainte-Foy
Québec, QC G1V 4C7

Abstract

Beauveria bassiana is an entomopathogenic fungus showing interesting perspectives as a microbial agent to control insect pests in agriculture and forestry. Two isolates of *B. bassiana*, *INRS-IP* and *INRS-CFL*, are investigated for their insecticide potential against the white pine weevil, the pine shoot beetle, the emerald ash borer and the white pine cone beetle. The optimization of conidia production must be considered in order to meet the needs for field application of *B. bassiana* isolates. The Fractional Factorial Analysis, Plackett-Burmen, was used to identify the interactions between abiotic factors that may affect the production of conidia and select those having a positive effect. Furthermore, selected factors were studied in order to identify the optimal conditions of conidia production using Response Surface Analysis Model, Central Composite Design. The conidia concentration per mL and the total volume in mL were measured during the experiments. Modification of some abiotic factors seems to improve the conidia production yield of *INRS-IP* and *INRS-CFL* isolates of *B. bassiana*. For these isolates, concentrations obtained during experiments were respectively 9×10^{11} and 1×10^{12} conidia mL^{-1}. Each *B. bassiana* isolate seems to require intrinsic abiotic factors for its growth. Our results support this observation. The large-scale production of constant and quality conidia will facilitate their integration of *B. bassiana* into phytoprotective strategies against insect pests. Moreover, the approach used during this project can be applied to other entomopathogenic fungi such as *Verticillium*, *Metarhizium* and *Tolypocladium*.

Résumé

Beauveria bassiana est un champignon entomopathogène intéressant pour contrôler les insectes nuisibles agricoles et forestiers. Deux isolats de *B. bassiana*, INRS-IP et INRS-CFL, sont particulièrement étudiés au Canada et ont récemment montré leur potentiel contre les populations du charançon du pin blanc, du grand hylésine du pin, de l'agrile du frêne et du scolyte des cônes du pin blanc. Afin de répondre aux besoins lors de l'application de *B. bassiana* sur le terrain, une optimisation des conditions de production à grande échelle doit être considérée. L'analyse factorielle fractionnée de type Plackett-Burmen a été utilisée afin d'identifier les interactions pouvant exister entre les facteurs abiotiques influençant la production des conidies. Par la suite, les facteurs sélectionnés ont été étudiés afin de définir les conditions d'optimisation de la production de chacun des isolats par la méthodologie de la surface de réponse de type « Central Composite Design ». Durant les expériences, deux paramètres ont été mesurés, la concentration des conidies par ml et le volume de filtrat récupéré (ml). La modification de certains facteurs abiotiques améliore le rendement de la production des conidies des isolats INRS-IP et INRS-CFL de *B. bassiana*. Le rendement optimal respectif de chaque isolat a été de 9×10^{11} et 1×10^{12} conidies ml^{-1}. Chaque isolat de *B. bassiana* semble requérir des facteurs abiotiques intrinsèques pour leur croissance. L'optimisation des conditions de production devrait assurer un approvisionnement constant et de qualité facilitant ainsi leur intégration dans les régies de phytoprotection contre les ravageurs. De plus, l'approche développée peut être appliquée à la production d'autres champignons entomopathogènes tels que *Verticillium*, *Metarhizium* et *Tolypocladium*.

EVIDENCE FOR A VOLATILE SEX PHEROMONE IN *AGRILUS PLANIPENNIS* FAIRMAIRE (COLEOPTERA: BUPRESTIDAE) THAT SYNERGIZES ATTRACTION TO A HOST FOLIAR VOLATILE

Peter J. Silk[1], Krista Ryall[2], Peter Mayo[1], Matthew A. Lemay[1], Gary Grant[2], Damon Crook[6], Allard Cossé[7], Ivich Fraser[8], Jon D. Sweeney[1], D. Barry Lyons[2], Doug Pitt[3], Taylor Scarr[4], and David MaGee[5]

[1] Natural Resources Canada, Canadian Forest Service, Atlantic Forestry Centre
1350 Regent Street
Fredericton, NB E3B 5P7

[2] Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre
1219 Queen Street East
Sault Ste. Marie, ON P6A 2E5

[3] Natural Resources Canada, Canadian Forest Service, Canadian Wood Fibre Centre
1219 Queen Street East
Sault Ste. Marie, ON P6A 2E5

[4] Ontario Ministry of Natural Resources
70 Foster Drive, Suite 400
Sault Ste. Marie, ON P6A 6V5

[5] Department of Chemistry, University of New Brunswick
Fredericton, NB E3B 6E2

[6] USDA, APHIS, PPQ, Otis PSDEL
Building 1398, West Truck Road
Buzzards Bay, MA 02542, USA

[7] USDA/ARS Crop Bioprotection Unit, National Center for Agricultural Utilization Research
1815 North University Street
Peoria, IL 61604, USA

[8] USDA APHIS PPQ
5936 Ford Court, Suite 200
Brighton, MI 48116-851, USA

Abstract

The identification of pheromones and/or chemical attractants would provide a much needed tool to facilitate improved monitoring of populations of the invasive emerald ash borer (*Agrilus planipennis*) (Coleoptera: Buprestidae). We tested the antennal and behavioral response to a

female produced compound (macrocyclic lactone, (3*Z*) dodecen-12-olide (3*Z*-lactone), as well as its geometric isomer, (3*E*)-lactone, alone and in combination with ash foliar and cortical volatiles, in field trapping bioassays. In field experiments with purple prism sticky traps, Phoebe oil significantly increased catch of both sexes of *A. planipennis* whereas green leaf volatiles (a combination of (3*Z*)-hexenol and (2*E*)-hexenol) significantly increased catch of males only. When combined with Phoebe oil or green leaf volatiles on purple traps, neither lactone isomer affected catches of *A. planipennis*. However, on green prism traps, the addition of either (3*Z*) lactone or (3*E*)-lactone to traps baited with (3*Z*)-hexenol significantly increased capture of male *A. planipennis* in one of two field experiments. Two key sensory cues may therefore be required by male *A. planipennis* in the mate-finding process: a visual cue (green) that likely mimics host foliage, and at least two chemical cues: a foliage volatile (kairomone), (3*Z*)-hexenol, and the female-produced sex pheromone, (3*Z*) lactone. We recommend this trap-lure combination as a monitoring tool and plan further field experiments to confirm and fine tune each of the three components to increase efficacy of detecting *A. planipennis*. These data are the first to demonstrate synergy in attraction of a sex pheromone and green leaf volatile in a Buprestid species.

Résumé

L'identification des phéromones ou des substances chimiques attractives pour l'agrile du frêne (*Agrilus planipennis*) (Coleoptera : Buprestidae) faciliterait considérablement la surveillance des populations de cette espèce envahissante. Dans le cadre d'essais de piégeage sur le terrain, nous avons étudié les réactions antennaires et comportementales induites par une lactone macrocyclique synthétisée par les femelles [(3*Z*) dodécène-12-olide (3*Z*-lactone)], utilisée seule ou en combinaison avec des substances volatiles foliaires et corticales libérées par l'hôte. Lors d'expériences effectuées sur le terrain avec des pièges collants violets en forme de prisme, l'utilisation d'huile de Phoebé comme appât a permis d'accroître de manière significative le nombre de captures d'individus des deux sexes, tandis que l'utilisation de substances volatiles émises par les feuilles vertes de l'hôte (combinaison de (3*Z*)-hexénol et de (2*E*)-hexénol) a entraîné une augmentation du nombre de captures d'individus mâles seulement. Utilisé dans les pièges violets en combinaison avec l'huile de Phoebé ou les substances volatiles émises par les feuilles vertes, aucun des isomères de lactone n'a eu d'effet sur le nombre d'agriles capturés. Toutefois, dans une des deux expériences réalisées sur le terrain avec des pièges verts en forme de prisme appâté de (3*Z*)-hexénol, l'ajout de (3*Z*)-lactone ou de (3*E*)-lactone a entraîné une

augmentation significative du nombre de captures d'individus mâles. Chez les agriles mâles, deux types de signaux sensoriels clés semblent intervenir dans la recherche d'un partenaire sexuel : 1) un signal visuel (couleur verte) imitant vraisemblablement le feuillage de l'hôte; 2) au moins deux signaux chimiques, soit une substance chimique émise par le feuillage (kairomone), le (3Z)-hexénol, et une phéromone sexuelle synthétisée par les femelles, le (3Z)-lactone. À l'heure actuelle, nous recommandons l'utilisation de cette combinaison de signaux pour la surveillance des populations du ravageur, tout en reconnaissant que de nouveaux développements prometteurs pourraient résulter de l'amélioration de chacune de ces trois composantes. La présente étude est la première à démontrer l'existence chez une espèce de bupreste d'un renforcement par une phéromone sexuelle de l'attraction exercée une substance volatile émise par le feuillage de l'hôte.

EMERALD ASH BORER DAY

Chair: ***Marcel Dawson***
Canadian Food Inspection Agency

JOURNÉE DE L'AGRILE DU FRÊNE

Président : *Marcel Dawson*
Agence canadienne d'inspection des aliments

EMERALD ASH BORER MANAGEMENT: MUNICIPALITY PERSPECTIVE

Jason Pollard

City of Ottawa
100 Constellation Crescent
Ottawa, ON K2G 6J8

Abstract

In July 2008 emerald ash borer (*Agrilus planipennis*) was discovered in the City of Ottawa. The threat to Ottawa's urban and rural forests is significant with an average of 20-25% ash composition in street and park trees and also across rural Ottawa in forested areas and private woodlots. In some areas of Ottawa there are many streets comprised of 80-100% ash that will be more challenging for urban forest managers.

With the support of City Council, a pest management strategy has been implemented to manage the impact on urban and rural forests and slow the spread of this invasive insect. This strategy includes an accelerated tree inventory program, a communications strategy, proactive tree planting in emerald ash borer (EAB) affected areas, a tree injection program, and a program to schedule ash tree removals and utilize wood from EAB killed trees. In addition, as a result of working closely with Canadian Forest Service researchers, an insect trap program has been established to monitor the extent of the infestation across the City.

To date 500 trees have been injected with TreeAzin, and over 1200 trees have been planted proactively, often beneath an ash overstorey. Tree removals in urban areas have been on a small scale with approximately 300 ash trees removed that have declined as a result of EAB.

These ash trees were used as part of a small trial to investigate the use of wood from trees affected by EAB. A tub grinder and portable sawmill were used to create wood chips and lumber for finished wood products. The outcome of this trial will help to determine future processes for handling and utilizing killed ash trees.

Many successes of this pest management strategy to date have resulted from partnerships including the Regional Forest Health Network, a partnership of local forestry stakeholders throughout the region to assist in decision-making and communication.

To date, costs of implementing the strategy are over $1M. Staff time to implement the strategy and to address the demand for information about EAB has increased costs and is expected to affect existing Forestry programs as staff time is diverted. Costs and time demand will increase in future years as the infestation progresses.

Questions remain about the required level of funding in future years and it is crucial that decision makers at all levels of government provide support and leadership to manage the impact of emerald ash borer. Answers to questions about rates of spread, best practices for monitoring, ash wood utilization, and questions about long term forest health impacts are important for forest managers and will become more important as EAB infestations increase in scale.

Emerald Ash Borer: An Update on the USDA APHIS Emerald Ash Program

Paul Chaloux

United States Department of Agriculture
Animal and Plant Health Inspection Service
4700 River Road, Unit 137
Riverdale, MD 20737, USA

Abstract

Emerald Ash Borer (EAB) was first detected in the United States in the Detroit area in 2002 after being introduced in the early to mid 1990s. Infestations are now known to occur in 15 states, including Illinois, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Missouri, New York, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin. Much of the spread of EAB appears to have occurred in the years between EAB's introduction and its detection in 2002. In order to prevent human assisted movement of EAB interstate, quarantines are established around all known infestations by the United States Department of Agriculture's Animal and Plant Health Inspection Service (APHIS). Approximately 270,000 square miles are currently under Federal Quarantine, with the majority of impacted states also maintain intrastate quarantines to protect uninfested counties within the state. Regulated articles include any life stage of EAB, ash trees, ash logs, untreated ash lumber with bark still attached, limbs, branches and stumps of ash trees, uncomposted ash chips larger than one inch in two dimensions, and all hardwood firewood. Movement of these articles out of a quarantined area is either prohibited (EAB and ash nursery stock) or mitigations must be applied prior to movement. Acceptable mitigations include heat treatment, complete removal of the bark and outer half inch of the xylem layer, or fumigation.

Surveys for EAB are conducted in order to support regulatory activities and to monitor the spread of EAB. APHIS uses a lure baited purple prism trap to survey for EAB. Traps are deployed in the spring prior to the emergence of adult EAB and are removed after 1500 base fifty degree days have accumulated. A grid based survey strategy is used to monitor the expansion of the generally infested area, and traps are also deployed at high risk sites such as campgrounds, sawmills and highway rest areas. Approximately 60,000 traps have been deployed each year

since APHIS began using the purple prism traps in 2008. Forty nine states participated in EAB survey work in 2010.

The 2010 survey resulted in the detection of EAB in two new states, Iowa and Tennessee. In addition, there were forty five new counties added to the list of known infested counties. Twenty six of these new county records were the direct result of adult EAB caught in traps; the remaining nineteen were by other means such as public reports of symptomatic trees. Since APHIS began using the purple prism traps a total of 118 new counties have been found to harbor EAB infestations.

Although control and management tools remain lacking for EAB, efforts to develop a biological control program using three species of parasitic wasps that attack EAB within its native range continue to show promise. APHIS is collaborating with the U.S. Forest Service and the USDA Agricultural Research Service in this effort. Experimental releases of the wasps began in 2007. In January, 2009 a rearing facility for the wasps began production. Twenty thousand wasps were reared at the facility in its first year of operation, in 2010 that number swelled to 150,000. Releases of the parasitic wasps have now occurred in eight states with releases at multiple locations within some of those states. Based on releases conducted in prior years and subsequent visits to those release sites, we know that all three species of wasps are capable of overwintering and completing a full generational cycle in the United States. Information on the impacts the wasps will have on EAB populations and stand health are being collected. An assessment of the wasps' impacts will likely take several more years to complete.

Other areas of active research include investigations into the genomics and genetics of both EAB and its host tree species. This work will support efforts to develop resistant ash stocks, among other things. In addition to the research into EAB and host genomics and genetics, APHIS also supports and monitors research to develop improved treatment and control tools, improved detection technologies, and the ecological impacts of EAB in both forest and urban settings.

Canadian Food Inspection Agency 2010 Emerald Ash Borer Survey Update

Erin Appleton

Plant Health Surveillance Unit, Canadian Food Inspection Agency
Guelph, ON N1G 4S9

Abstract

The Canadian Food Inspection Agency's Plant Health Surveillance program is conducted in accordance with plans coordinated and administered by the Plant Health Surveillance Unit (PHSU). The PHSU designs new surveys and refines current survey techniques and tools and strives to provide training and technical support to operational staff and partners. The majority of our plant health surveys are designed to detect new introductions of exotic pest species not known to be present in Canada or to detect new populations of quarantine pests with limited distributions in Canada. More specifically, the Emerald ash borer (EAB) survey program is designed to maintain the "pest free" status of specific areas and provide information in support of regulatory programs. Our National Surveillance Program provides the foundation for science-based regulatory decisions.

A multi-tactic survey approach is employed for detection of EAB in Canada. Our detection surveys focus on areas where EAB is most likely to have been introduced through human activities including; areas with ash decline, commercial pathways, as well as the nursery stock pathway and the firewood pathway. We utilize two types of visual detection surveys: 1) Scouting for ash decline in which inspectors assess urban areas and transportation corridors for broad-scale ash decline between mid-July and late-September 2) Ground surveys conducted at high risk locations which include areas with ash decline identified through scouting activities. The Canadian Food Inspection Agency also conducts trapping surveys using green prism traps baited with (Z)-3-hexenol bubble cap lures. Traps are deployed in urban areas and at high risk sites between June 1st and August 31st. The CFIA targeted approximately 1500 sites for visual and trapping survey activities across Canada in 2010. EAB infestations were identified at several new locations in Ontario in 2010. EAB adults were intercepted in traps located in the following areas: Leeds and Grenville, the City of Gatineau, the City of Ottawa outside the currently regulated area,

and Perth County. EAB was also identified in Oxford, Wellington and Waterloo through visual survey activities. EAB was discovered in Brant County for the first time through a municipally-led branch sampling initiative.

In 2008, the Canadian Food Inspection Agency conducted a pilot project in collaboration with Ontario Ministry of Natural Resources and the Canadian Forest Service, to determine if aerial surveys are an effective tool for identifying and locating declining ash. This pilot project proved worthwhile because we were able to cover a large geographical area over a short period of time and we were able to accurately identify ash from the air. In 2010, the CFIA collaborated with various partners to conduct aerial surveys. Stressed and declining ash was identified and mapped in Manitoba, New Brunswick and Quebec. These locations will be prioritized for detection surveys in 2011.

The CFIA has also supported work conducted by Philip Careless, M.Sc., University of Guelph, on biosurveillance using *Cerceris fumipennis*, a Buprestid hunting wasp, for detection of Emerald Ash Borer. Although biosurvellance can not be used for operational surveys because the wasp is very susceptible to local weather patterns, this concept is perceived to be an excellent outreach tool and subsequently, an effective means of promoting EAB awareness. The PHSU is considering supporting a Wasp Watchers Citizen Scientist pilot project in 2011.

In 2011, the CFIA will continue to utilize a multi-tactic surveillance strategy for detection of EAB in unregulated counties. The 2011 National Survey Protocol for EAB will be revised to incorporate recommendations made by the EAB Science Committee.

Emerald Ash Borer Day Reports

Introduction

As part of the 2010 Forest Pest Management Forum, a one day consultative meeting on the Emerald Ash Borer (EAB) was organized by the Canadian Food Inspection Agency (CFIA) on December 2, 2010 in Gatineau, Québec. The meeting was attended by approximately 180 participants, including government officials, representatives of industry associations, forestry companies, lumber mills, forest contractors, woodlot owners and tree growers.

The purposes of the meeting were to share information on recent scientific findings, new detection tools and control measures; present a variety of municipal, provincial and national perspectives; and solicit feedback from all relevant stakeholders with respect to the development of new regulatory options to mitigate the risks and impacts associated with the Emerald Ash Borer (*Agrilus planipennis*).

The agenda (attached in Appendix A) included the following elements:

1. Introduction and opening remarks.
2. Update on Science Committee initiatives and current EAB research.
3. Provincial perspectives from both Ontario and Quebec.
4. Municipal perspective from the City of Ottawa.
5. Industry presentation.
6. Update on American and Canadian Regulatory and Survey Initiatives.
7. Facilitated discussion on the development of a collaborative national EAB strategy and key tools and services required to effectively manage the spread of EAB.

At the end of the day, stakeholders were primarily concerned with the ecological and financial impact of tree removal and the diversion of time and resources it would entail.

Most participants agreed that key components of an effective EAB management strategy would include effective and practical early detection tools, strong regulatory measures, awareness campaigns and public outreach initiatives, and active enforcement of regulatory measures.

Key players of a collaborative strategy would include several federal departments and agencies, provincial, territorial and municipal governments, industry sectors and associations, non

governmental organizations, academic communities, the general public and other relevant stakeholders.

Participants agreed the strategy would require strong commitment on behalf of all of its partners and need to take an integrated management approach that would include the development of a management plan with identified priorities, clear roles and responsibilities and support for enhanced communication and cooperation between all partners.

Opening Remarks

Marcel Dawson,
National Manager of the Canadian Food Inspection Agency's Forestry Division

To set the context, Mr. Dawson provided an overview of the Emerald Ash Borer infestation in Canada. He indicated the first case of Emerald Ash Borer was discovered in Detroit in 2002. A few months later, it was discovered across the border; in Windsor. It has since killed tens of millions of ash trees in 15 American states and several municipalities in southern Ontario and Québec, posing serious economic and environmental treats to urban and forested areas. In the early days of the outbreak, CFIA issued disposal notices to suppress the insect in Canada. Since then, the federal government has shifted its efforts to spread management. The purpose of this forum is to gather various perspectives on how to collectively manage this problem going forward in order to slow the spread of the Emerald Ash Borer and protect Canada's forest resources.

Jacques Gagnon,
Director of the Science Policy Division of Natural Resources Canada

Mr. Gagnon pointed out that eight or ten years ago, very little was known about the Emerald Ash Borer. Since the first outbreak, federal partners and several jurisdictions have been able to work collaboratively to share research, information and best practices to slow the spread of EAB. He indicated the purpose of the meeting is to continue those collaborative efforts and establish more partnerships to better understand the scope of the problem and continue to find solutions to address it.

Science Committee Update

Barry Lyons,
Chair of Science Committee and Research Scientist in Insect Spatial Analysis for Natural Resources Canada

Mr. Lyons provided an update on the science and research currently being undertaken on the Emerald Ash Borer, as well as an update on recent initiatives of the Science Committee, whose role it is to make science-based recommendations to CFIA and other agencies on the regulatory and policy aspects of EAB management.

Currently, EAB research ranges from genomics-level, organism-level, population-level and ecosystem-level processes. The main purpose of the research is to develop new and improved mitigation and detection tools, and provide sound science to support decision-making processes to address EAB in Canada. Current research initiatives cover:

- Host and *Agrilus planipennis* integrative genomics.
- EAB sensory genomics.
- Chemistry of host plant, host selection studies, plant biochemicals and defence mechanisms of host.
- Overwintering physiology of the EAB.
- Aspects of the Pheromone Chemistry of EAB.
- Urban tree sampling.
- Systemic insecticides for control of EAB.
- Augmentative biological control/local exploration.
- Exploration and exploitation of native entomopathogens for managing EAB in Canada.
- Ecological consequences of EAB infestations.
- Pathways of human-assisted introductions of EAB.
- Economic impacts of EAB to Canada.

Ontario Perspective

Taylor Scarr,
Provincial Forest Entomologist from the Ontario Ministry of Natural Resources

Mr. Scarr provided a provincial perspective to EAB management. He indicated the Ontario Ministry of National Resources (OMNR) expects a continued spread of EAB, resulting in significant increases in tree mortality in urban areas. Movement of firewood and nursery stock is causing the greatest spread of EAB, with slower EAB advances in the north due to cold-weather temperatures. Over the long term, OMNR is concerned about the entire ash resource in Ontario.

Under the Federal Plant Protection Act, the Canadian Food Inspection Agency's role is to protect plant life and the agricultural and forestry sectors of the Canadian economy. It does so by preventing the importation, exportation and spread of pests and by controlling or eradicating pests in Canada. However, the EAB burden is too great for any one organization. Municipalities, provincial governments and federal governments must take a leadership role to ensure appropriate measures are taken to effectively quarantine the EAB infestation and mitigate the impacts of EAB on Canada's forests. Components of a comprehensive invasive species strategy include: a risk assessment; prevention; early detection; rapid response and eradication; control and management and a restoration evaluation. The OMNR's role is to provide scientific advice; surveys and detection tools; research field support and funding; and forest management expertise.

Since EAB was first detected in Canada in 2002, there have been significant advances in research in understanding the biology of the EAB, on detection tools (green prism traps and 3Z hexenol), control and bio-control options, and the ecological impacts of the insect. OMNR's current research priorities with regards to EAB are on detection and survey tools, insecticide products to protect trees, impact assessment and long-term bio-control.

Although the EAB challenge in is daunting, success can be achieved through collaboration and continued research advances in detection, control, impacts and strategies.

Quebec Perspective

Pierre Therrien,
Ministère des Ressources naturelles et de la Faune du Québec

Mr. Therrien provided a different provincial perspective on the Emerald Ash Borer issue. The presentation focused on key findings since the first EAB discovery in Québec and possible next steps to deal with the issue.

EAB was discovered in the province of Québec in June 2008 in the municipality of Carignan. At the time of this discovery, few trees were infected over a small surface area and the infestation was less than 5 years old. In response, a collaborative effort was undertaken to fell the infected trees and slow the natural spread of EAB. Possible next steps to manage the spread of EAB in Québec include 2 components:

1. In EAB infested areas, we need to maintain regulation; cut infested trees in isolated areas such as Carignan; intensify communication activities and public outreach; provide support to municipalities to help them reduce the impacts of EAB on their territory by providing information on tree species that could replace ash.

2. In non-infested areas, communication efforts towards citizens and municipalities must be undertaken in order to improve understanding of the importance of being ready for EAB and to encourage them to immediately begin to diversify the tree species used for replanting.

Support for EAB related research activities is important, particularly those related to improvement of detection methods and development of new control methods.

Quebec wants CFIA to continue its regulatory activities, increase its communication and detection activities and consider regional aspects in its EAB management strategy.

In conclusion, managing this complex problem will require multi-stakeholder collaboration. If appropriate measures aren't taken to slow the spread of EAB in Québec, it is estimated that 95% of the ash in the province will be destroyed, resulting in severe environmental and socio-economic impacts.

Emerald Ash Borer Day Reports

Municipal Perspective

Jason Pollard,
Senior Forester with the City of Ottawa's Forestry Services Branch

Mr. Pollard provided a municipal perspective to the EAB issue. In 2008, the City of Ottawa tried to determine the extent and intensity of the EAB infestation. A green prism trap program was established in 2009 to survey the extent of the problem. By 2010, it was clear the infestation had spread in all directions. A multi-stakeholder Regional Forest Health Network was put together to aid in the implementation of a pest management strategy that would manage the forest cover in Ottawa. Components of the strategy include tree planting, ash tree injection (TreeAzin), tree removal, and wood management and utilization. The strategy also contains an important communication component that includes updates to city council, an information website, newspaper and radio advertising, mail outs, training, community presentations, and rural messaging.

In conclusion, the EAB infestation in Ottawa is only in its early stages and additional efforts and funding will be required in future years. The issue is challenging, time-consuming and expensive, and it will be critical to keep it in front of decision-makers, leaders, communities and partners.

Industry Perspective

Guy Genest,
Primewood Lumber Inc.

Mr. Genest brought an industry perspective to the table. He noted ash trees are an important source of valuable timber for the forest product industry. The presentation focused on the major economic impacts suffered by the lumber industry due to the continued spread of EAB in Ontario and Québec.

In March 2009, the European Union introduced strict new regulations on lumber imports which have had major repercussions on the Canadian lumber export market. These new regulations require that all wood products imported into the EU be issued a phytosanitary certificate, guaranteeing the wood is free of EAB, within 14 days of when the shipment leaves the country of

origin. To meet these new regulatory standards, the wood must either be squared to entirely remove the round surface or originate from an area known to be free of EAB. Considering the expanding EAB quarantine zone in Canada, these new regulations are devastating to companies like Primewood Lumber, whose exports to foreign markets like the EU and the US make up 95% of their total sales.

The consequences of managing the EAB infestation have been increasingly costly for the lumber industry. As a result, the lumber industry is looking for assistance in the development of a new science-based treatment standard for North American wood that would facilitate the verification and certification of export products and ensure a secure product while maintaining important export markets. It is looking for leadership from the federal government to ensure this standard is recognized in Canada, the EU and the US.

United States Update

Paul Chaloux,
National EAB Program Manager with the United States Department of Agriculture, Animal and Plant Health

Mr. Chaloux provided an update on EAB regulatory and survey measures in the United States. He indicated the US regulatory program and outreach activities are minimizing the effect of human assistance spreading patterns and having a positive effect on slowing the spread of the infestation. The presentation focused on promising practices currently used in the US, including a biological control rearing facility, a dendrochronology laboratory and "tree age" insecticide. Today, 270,000 square miles in 15 states are under federal quarantine. Current regulations encompass the Emerald ash borer, entire ash trees, ash logs, untreated ash lumber with bark attached, ash limbs and branches, all hardwood firewood, uncomposted ash chips and any other article determined to present a risk of spreading EAB.

Active research areas with regards to EAB in the United States include genomics, genetics, host resistance, treatment and control tools, ecological impacts, modeling EAB spread, and improved survey and detection technologies.

For more information, visit http://www.aphis.usda.gov/ or http://www.emeraldashborer.info/ .

Emerald Ash Borer Day Reports

Canada Update

Erin Bullas-Appleton ,
Plant Health Survey Biologist, Canadian Food Inspection Agency

Ms. Bullas-Appleton provided an update on EAB survey measures in Canada. She indicated the Plant Health Surveillance Unit's role is to plan, coordinate and administer the national EAB survey program. It designs new surveys and refines survey techniques and tools while providing training and technical support for operational staff and liaising with other departments, industry and external parties.

The purpose of the surveys is to detect new introductions of exotic pest species, maintain pest-free status of an area and detect new populations of quarantine pests. The objective is also to provide information in support of regulatory programs and provide a basis for sound science-based regulatory decisions.

Ms. Bullas-Appleton provided an overview of EAB survey tools and techniques that are employed and supported by CFIA, including ongoing aerial and ground surveys, trapping surveys, branch sampling and site categorization. The focus of these activities is on areas where EAB is most likely to have been introduced through human activities, for example through the private movement of firewood and nursery pathways.

Next steps include continuing with a multi-tactic EAB surveillance strategy and conducting a review of all finds to date to set priorities appropriately. Protocols will also be revised to incorporate the EAB Science Committee's recommendations.

Mireille Marcotte,
Forestry Specialist for the Canadian Food Inspection Agency

Ms. Marcotte provided an overview of CFIA's approach to the EAB infestation; including surveillance, regulation, enforcement, and communications/outreach initiatives. She indicated CFIA's objective is to prevent the artificial spread of EAB within Ontario and Quebec and to protect the rest of Ontario, Quebec and Canada from infestation. Current regulations with respect to EAB include a Prohibition of Movement on individual properties, Ministerial Orders on larger geopolitical areas, policy directives and movement certificates. The *Plant Protection Act* and the

Agriculture and Agri-Food Administrative Monetary Penalties Act are in place to enforce compliance of these regulations.

One of the challenges of the EAB infestation is that it moves naturally as well as artificially by several pathways. As such, CFIA is also focusing on community outreach programs, including: notifying residents in regulated areas of the movement restrictions in place; informing industry about regulations and compliance programs, raising awareness of the risks of invasive forest pests and movement of firewood as a risk pathway; and providing training to arborists and foresters about the biology, means of spread, detection and control measures for EAB.

Proposed Regulatory Measures

The CFIA is considering opportunities to enhance the regulatory controls in an effort to more effectively reduce the spread and establishment of EAB through human assisted pathways.

Once a specific area is declared infested, surveillance activities cease in that area so CFIA can focus its resources on other areas where EAB has not yet been detected. Scientific evidence acquired through years of surveillance and research indicates that many other ash trees in an infested area will also already be infested.

Based on the history and experience with EAB in Ontario, the CFIA is considering regulatory measures to address the most recent finds in Ontario and in Quebec, and to safeguard movement of potentially infested material from areas where it has yet to be detected.

A second regulatory tier on Ontario and Quebec could be added to reduce the risk of artificial spread of EAB to the rest of Canada and the US. The province of Ontario and Quebec would be considered at risk for harbouring undetected populations of EAB, and regulated through a ministerial order, whereas individual counties within Ontario and Quebec would then be declared infested and regulated through policy.

For regulated articles originating in the cautionary zone, where EAB has not yet been detected, movement certificates would be required for movement outside of Ontario and Quebec; otherwise no restrictions for movement within or between these provinces. EAB Surveys would continue in the cautionary zone to determine the range for EAB in Ontario and in Quebec. This measure would expedite the addition (or inclusion) of newly EAB-confirmed areas to the infected

zone. For regulated articles originating in the infected zone, movement certificates would be required for movement outside of the zone; otherwise there are no restrictions for movement within an infected zone.

After being presented with the proposed regulatory measures, participants asked a few question of clarification.

Facilitated Dialogue

In the afternoon, meeting participants engaged in a facilitated dialogue to provide feedback on the proposed regulatory measures and explore a collaborative management framework for EAB. The following five questions were discussed:

1. What do you see as the key components/tools to effectively manage the spread of EAB?
2. How has EAB impacted you so far and what are your major concerns/issues with the proposed regulatory measures?
3. Describe a program that would support a collaborative national EAB strategy.
4. Who should be the key players in this collaborative national EAB strategy and what should be their respective roles?
5. What other services and tools would you like to see federal agencies or provincial ministries provide to assist in the management of EAB?

The following key messages emerged from the discussions:

1. What do you see as the key components/tools to effectively manage the spread of EAB?

The majority of the group agreed that stronger regulatory measures were required to effectively manage the spread of EAB. Participants remarked on the lack of active enforcement of the measures currently in place and noted the importance of collecting and analyzing data on the results of the enforcement and the effectiveness of the quarantine. They emphasized the need to actively enforce the new measures, and to pre-empt this active enforcement with public outreach initiatives and awareness campaigns to educate the public.

Intense public messaging on the EAB issue was recommended through various media such as radio, television and print newspapers to reach a large portion of the Canadian population. Central to this issue is the need to educate the public on the risks and consequences of moving

firewood. Public education at the school-age level was highly recommended. Using highway signs to communicate early detection efforts and management responses to the public was suggested. Many participants viewed effective and practical early detection tools combined with effective management strategies as key components of an EAB management strategy. The group recommended taking a targeted approach based on local circumstances to deploy early detection tools in high risk areas and increase sampling, survey and monitoring intensity. For example, decreased regulation on those municipalities that are taking a more active role in pest management and treating outliers differently by trying to contain or eradication were suggested. Some participants also suggested that provinces could enact their own buffer zones and regulate movement.

A recommendation was made to develop tools for homeowners, such as documented best practices for woodlot management to mitigate EAB. Many participants also recommended the development of cost-effective residual disposal options for mills and municipalities.

Some pointed out the need for an immediate allocation of research funds and resources towards an EAB management strategy. These funds could help: develop decision support systems for municipalities; improve early detection technology and tools such as remote sensing capability; develop better ash inventory systems for municipalities and counties; develop practical methods for delineating an outbreak area after it is detected; study pheromone attractant; utilize population modeling to develop a better understanding of how EAB will behave under various conditions and in new infested areas; study the impact of foreign parasites on native beetles in Canada and look for resistance in host species; develop alternative survey tools, and; develop a public digital reporting capability. Others suggested the approval of biological controls in Canada as a key way to manage the infestation.

Increased communication between all partners and stakeholders was viewed by most participants as a key component of an effective EAB management strategy. This includes knowledge and information-sharing as well as sharing of best practices across jurisdictions and developing a better understanding of what drives the pathways and why people move firewood to address the problem at its source. Collection and exchange points at all high risk areas, including border crossings and campgrounds, were also suggested. Developing best practices on

bio-control introductions and insecticides use was also identified as a key component of an EAB management strategy.

Some participants suggested that EAB-related training opportunities for all relevant stakeholders and accessible forest management expertise would be critical to the success of an EAB management strategy.

On the subject of trade, some industry representatives suggested the negotiation of treatment protocol acceptance for lumber export, the harmonization of international regulations and the streamlining of bio-control certification.

2. How has EAB impacted you so far and what are your major concerns/issues with the proposed regulatory measures?

Some participants felt that the infested zones are too large, which allows for the movement of wood and does not slow down the spread of EAB. They noted that under the proposed regulations, Leeds and Grenville united counties would be regulated with only one find. The proposed regulatory measures were thus seen by some as heavy-handed, cumbersome and were said to negatively impact industry in each province, perhaps unnecessarily. Some participants also thought that the proposed options would create an operational work area again.

The majority of participants felt it would be important to establish a long-term plan to manage EAB in Canada and ensure it remains a political priority. They were concerned the federal government would only fund management efforts on the short-term.

Although some suggested that EAB is probably already in the cautionary zone, a smaller buffer zone was recommended. It was suggested that the development of the buffer zone be based on the age of the infestation and consider the natural and artificial spread of EAB. Participants noted the need for more survey work to ensure the proposed buffer zones are based on sound science and evidence of risk. A western buffer zone between Ontario and Manitoba and one to delineate the eastern boundary between Québec and New Brunswick was suggested as a possibility. Some participants recommended a cross-country consultation to determine the impacts of buffer zone regulations within each region. They also recommended looking outside of the regulatory zone to prepare municipalities for future EAB infestations.

The presence of EAB has had a major impact on the nursery industry sector across Canada, especially within Ontario and Québec. Some industry representatives asked for proper mitigation

of trade impacts on the nursery industry and lumber yards in both the infested and cautionary zones. Specifically, industry stakeholders were concerned they would be unable to sell ash nursery stock from regulated areas to other areas and provinces. They also voiced concern about further market restrictions for the industrial sector.

The majority of the group agreed the proposed regulatory measures would have serious impacts on some municipalities; for example on solid waste management in Toronto. The ecological and financial impact of removing hundreds of thousands of ash trees was cited as the biggest concern with the proposed regulatory measures. Participants were concerned that the impacts of EAB on biodiversity are not being addressed in the proposed regulations. Most participants also identified the required diversion of time and resources as a major issue for many stakeholder groups. For example, some were concerned that research funding was focused on EAB at the expense of resistance research for other exotic pests such as butternut canker and beech bark disease.

Participants agreed that regulations would not be an effective tool without survey information, robust and timely detection methods and a solid understanding of how EAB is moved by humans. Some participants felt that woodlot owners are misinformed on EAB and could be better prepared to manage their lots. There is a need to do more outreach outside of the regulated zones and prepare for future EAB finds. The group suggested that public awareness campaigns may be more effective than regulations in managing EAB infestations.

A few participants noted there was a perception that CFIA does not value the efforts made by the Province of Quebec in Carignan. Some participants were also concerned that the current ministerial orders do not address a national spread. It was mentioned that a more time efficient process for putting ministerial orders in place is needed. Other participants felt that they did not had sufficient survey information to be able to recommend a proposed regulatory direction and that it was difficult to establish which stakeholders would be the most affected (e.g. municipalities, sawmills, etc.). Finally, it was suggested that the imposed regulations are ineffective due to lack of enforcement and that there is a need to consider the U.S. regulations.

3. Describe a program that would support a collaborative national EAB strategy.

Participants described a program that would support a collaborative national EAB strategy as one that would be CFIA led and focus on collaborative prevention, detection and management strategies between federal, provincial and municipal stakeholders.

The majority of the group identified buy-in from federal, provincial and municipal governments, and committed resources and funding moving forward as critical elements of a collaborative national EAB strategy. Such a strategy would have regional and international components, and include a strategy to address outliers.

A national collaborative strategy should include a central governing structure, an integrated management framework, identified priorities and clear roles and responsibilities. Participants recommended establishing Working Groups at a regional or provincial level to provide support on an as needed basis. Working Group representation should include all levels of government, industry and grassroots organizations and could serve to establish a network where all stakeholders have the ability to provide input.

Communication and cooperation between jurisdictions was identified as a key priority for stakeholders in the room, including involvement at the municipal level. To facilitate collaboration between stakeholders on a national scale, participants suggested developing a user manual on collaboration and establishing governance structures for strategic partnerships. Many participants recommended designating an EAB provincial coordinator to collect and disseminate information from affected municipalities to assist non-affected municipalities in their preparations against an EAB infestation.

Some participants suggested combined survey efforts and data sharing could be supported by collaborative research programs and joint R&D applications. The development of cost-shared EAB detection programs and tree removal programs was suggested by most participants. Most also recommended the development of cost-effective disposal options for non-commercial sectors. Some participants suggested developing municipal by-laws to remove at-risk ash trees on private properties.

Participants suggested the provision of free firewood at campsites and the regulation of firewood suppliers in Ontario and Québec might be important components of a national EAB strategy. The introduction of biological control agents, an extension of outreach programs, an increase in

woodlot and forest delimitation and detection surveys, as well as survey staff, and enforcement of regulatory orders were all identified as important components of a national EAB strategy. Participants recommended taking a targeted approach based on local circumstances and consistent national messaging through public outreach and awareness campaigns.

Industry stakeholders also recommended the negotiation of viable lumber/log treatment for markets and alternative to lumber cut restrictions.

4. Who should be the key players in this collaborative national EAB strategy and what should be their respective roles?

Federal Government

Participants noted that forest management in Canada is a shared responsibility between federal and provincial governments. The EAB challenge in Canada is a horizontal issue that requires the commitment and coordination of several federal departments and agencies. Leadership for a national EAB strategy, including prevention, detection and mitigation aspects, was viewed by most participants as the responsibility of the Canadian Food Inspection Agency, in collaboration with provincial and territorial governments. Participants felt CFIA should contribute more financial resources to help mitigate the impacts of EAB, particularly to support the development of new survey tools. It was also suggested CFIA develop new, more effective administrative options to support their mandate.

In addition, the federal government was seen as responsible for all issues pertaining to international trade: many participants noted it was the responsibility of the CFIA to develop appropriate regulations in collaboration with international research partners.

Parks Canada and the Canadian Forest Service were viewed as able to contribute forest resource expertise, scientific research and public outreach, with the Pest Management Regulatory Agency providing specific expertise in bio-control regulations. These organizations would provide as much science-based knowledge as possible to the stakeholder committees. Other agencies could provide in-kind support and financial resources.

To note, continued support and financial commitment from Federal Ministers was viewed by many participants as critical to the successful management of EAB. The majority of participants called for long-term funding commitments (5+ years) for research & development, communications, control and eradication programs, especially in outlier populations.

Provincial and Territorial Governments

As provincial and territorial governments are responsible for natural forests management and pest suppression programs, the provinces and territories were seen to play an important role in the eradication, containment and control of EAB, with specific efforts made in surveys, population control and outreach. Some participants suggested the provinces should step up and enact regulations to manage EAB and that OMAFRA (Rural Affairs) should play a much larger role considering the vast majority of trees lost have been or will be in rural areas. This calls for the collaboration of provincial, territorial and federal departments in the forestry, parks and transportation sectors. For example, the Ontario Ministry of Natural Resources was viewed as able to provide forest management expertise, scientific advice, increased survey work and detection tools, research field support and funding.

Participants felt the role of the Ministry of Transportation could be to contribute data on transportation trends on a number of trade pathways that fall under provincial jurisdiction. Some participants recommended designating an EAB provincial coordinator to collect information, liaise with municipalities and help manage communication efforts. The coordinator would assist municipalities that are currently EAB-free in their preparations against a possible future infestation.

Municipalities

Municipalities were viewed as playing a major role in the detection and management of EAB in urban areas, specifically with the management of street trees, surveys and public outreach initiatives. Many participants noted increased collaboration will be required between provinces, municipalities and private landowners; for example to provide disposal assistance to landowners. Participants noted smaller municipalities may not be able to afford control programs and will have to be funded from higher levels of government.

The Association of Municipalities of Ontario was viewed by some as a key player in providing tools and information to municipalities and disseminating information to the public.

Stakeholder Groups

Other stakeholder groups were also identified as key players in the response to the EAB threat. These stakeholder groups include industry sectors and associations, academic communities, non-governmental organizations and the general public.

Forestry industry and associations, including wood producers, woodlot associations and Canadian Lumberman Associations, play a key role in networking, communication, compliance, education and research support. Furthermore, the horticulture industry was viewed as able to provide leadership and knowledge in breeding.

Many participants suggested the role of academic communities is to provide research, science leadership and a solid knowledge base.

Furthermore, participants noted non-governmental organizations have a strong role to play in communications and public outreach. Mirroring current successful outreach efforts from the USA could help move this initiative forward.

The general public, such as woodlot owners, homeowners, campers and naturalist groups, are also key players in EAB management. Their roles and responsibilities include compliance, public outreach and tree management. Participants noted outdoor recreation services also need to be more involved.

5. **What other services and tools would you like to see federal agencies or provincial ministries provide to assist in the management of EAB?**
    - Support/subsidies for tree disposal.
    - Supply (or subsidize) free firewood at campsites.
    - Assistance in defraying the cost of tree removal for private landowners (e.g. tax reduction).
    - Decision support system for municipalities.
    - Support for smaller municipalities (e.g. funding, expertise, tree inventories, tree planting).
    - Funding to provinces/municipalities for detection, monitoring, survey, response and control.
    - Being able to age infestations to best inform decisions.

- Buffer development- consider natural and artificial spread, age of infestation and need/value: smaller intensely managed.
- Introduction of bio-control tools.
- Investments in research and development for resistant strains of ash.
- Recommendation of tree/site match for urban tree management.
- Improve information and outreach on mitigation options for all relevant stakeholders.
- Development of more communication materials for the general public.
- Advice and expertise for forest managers.
- Use of social media to get the message out.
- Marketing strategy for ash products.
- Market research to determine more effective public communication strategies.
- Regulation of firewood vendors in Ontario and Québec.
- Outline of Federal, Provincial and Territorial roles and responsibilities.
- Aerial surveys for larger contiguous forest blocks and lands.
- New measures to update mapped data on the infestation.
- Collaborative management tools.
- Support for lumber industry exports to the EU.
- Owner's manual outlining best practices for tree management/practical knowledge on how to manage outbreaks for smaller municipalities and land owners.
- Long term programs (5-10 yrs) and sustainable funding commitments to develop more stability and predictability.
- Continued support for programs currently in place.
- EAB management specialists to coordinate efforts.
- Municipal communication networks.
- Legislative change to clarify roles and the intention of the Act.
- Tools to streamline EAB management.
- Proactive communication of administrative bounds for regulatory zones.
- Communication efforts on behalf of federal and provincial partners to ensure municipalities understand the options and tools available.
- General emphasis on more proactive approaches.
- Non-native parasitoid tools similar to those developed in the US.
- Detection and surveillance techniques that are rapid, effective and coordinated.

- Tools to determine the age of infestations to better inform decision-making.
- Priority funding for research projects with deliverables in 1-2 years.
- Pest management tools for immediate use.
- Compensation for tree removal or treatment through tax credits.
- Silvicultural recommendations for forest managers.

Closing Comments

Marcel Dawson,
Canadian Food Inspection Agency

Mr. Dawson thanked participants for their attendance and outlined the importance of pooling resources and expertise to continue the dialogue on the best way forward for a collaborative management approach to EAB. He indicated this was only the start – between now and the end of January, CFIA will continue to reach out to various stakeholders to get their perspectives and support. In the New Year, a decision will be made regarding the approach to take in terms of establishing regulated areas and setting priorities moving forward. Any additional questions, thoughts or insights can be sent to EAB@inspection.gc.ca.

APPENDIX A

Emerald Ash Borer Day

December 2, 2010

Chaudière Ballroom, Château Cartier, Gatineau, Québec

08:00 **Registration**
Chair: *Marcel Dawson, Canadian Food Inspection Agency*

09:00 Introduction and welcoming remarks
Marcel Dawson, Canadian Food Inspection Agency
Jacques Gagnon, Natural Resources Canada, Canadian Forest Service

09:10 Science Committee Update
Barry Lyons, Natural Resources Canada, Canadian Forest Service

09:30 Ontario Perspective
Taylor Scarr, Ontario Ministry of Natural Resources

09:5? ıébec Perspective
. ierre Therrien, Ministère des Ressources naturelles et de la Faune du Québec

10:10 **Break**

10:40 Municipality Perspective
Jason Pollard, City of Ottawa

11:00 Industry Perspective
Guy Genest, Primewood Lumber

11:20 United States Update – Regulatory and Survey
Paul Chaloux, United States Department of Agriculture, Animal and Plant Health

11:40 Canada Update – Regulatory and Survey
Mireille Marcotte, Canadian Food Inspection Agency
Erin Bullas-Appleton, Canadian Food Inspection Agency

12:00 **Lunch**

13:00 Facilitated Session – Challenges & Solutions for Effective EAB Management
(Presentation and table discussions)

14:30 **Break**

15:00 Informal discussions and reports of items discussed during the facilitated session, and closing comments

16:00 **Adjourn**

Compte rendu de la journée sur l'agrile du frêne

Introduction

Dans le cadre du Forum sur la répression des ravageurs forestiers 2010, une réunion consultative d'une journée portant sur l'agrile du frêne a été organisée par l'Agence canadienne d'inspection des aliments (ACIA) le 2 décembre 2010 à Gatineau, au Québec. Environ 180 personnes ont participé à cette réunion, notamment des représentants du gouvernement, d'associations industrielles, de compagnies forestières et d'usines de bois de sciage, des entrepreneurs forestiers, des propriétaires de lots boisés et des arboriculteurs.

Les objectifs de cette réunion étaient d'échanger des renseignements sur les dernières découvertes scientifiques, les nouveaux outils de détection et les nouvelles mesures de contrôle; de présenter différents points de vue municipaux, provinciaux et nationaux et de demander des commentaires à toutes les parties concernées relativement à l'élaboration de nouvelles options de réglementation en vue d'atténuer les risques et les répercussions liés à l'agrile du frêne (*Agrilus planipennis*).

L'ordre du jour (joint à l'annexe A) comprend les points suivants :

1. Présentation et mot de bienvenue.
2. Mise à jour des initiatives du comité scientifique et recherches actuelles sur l'agrile du frêne.
3. Points de vue provinciaux de l'Ontario et du Québec.
4. Point de vue municipal de la ville d'Ottawa.
5. Présentation de l'industrie.
6. Mise à jour des Initiatives canadiennes et américaines portant sur les règlements et les enquêtes.
7. Une discussion animée portant sur l'élaboration d'une stratégie collaborative nationale sur l'agrile du frêne ainsi que sur les outils et les services nécessaires pour gérer l'expansion de l'agrile du frêne de manière efficace.

Lors de cette journée, les parties prenantes étaient en premier lieu préoccupées par l'incidence écologique et financière de l'abattage des arbres et de la réaffectation du temps et des ressources que cela implique.

Compte rendu de la journée sur l'agrile du frêne

La majorité des participants ont convenu que les composantes principales d'une stratégie de gestion efficace de l'agrile du frêne comprendraient des outils de détection précoce et efficace, des mesures réglementaires rigoureuses, des campagnes de sensibilisation et des initiatives d'information qui visent le public ainsi qu'une application active des mesures réglementaires.

Les acteurs principaux d'une stratégie concertée compteraient plusieurs ministères et organismes gouvernementaux, les gouvernements provinciaux, territoriaux et les administrations municipales, le secteur de l'industrie et les associations, les organisations non gouvernementales, la communauté universitaire, le grand public ainsi que d'autres parties prenantes concernées.

Les participants ont convenu que la stratégie demanderait un engagement profond au nom de tous les partenaires et nécessiterait l'adoption d'une approche intégrée qui inclurait la mise au point d'un plan de gestion présentant des priorités déterminées, des rôles et des responsabilités claires et un appui pour améliorer la communication et la coopération entre les partenaires.

Mot de bienvenue

Marcel Dawson,
Gestionnaire national de la Division des forêts de l'Agence canadienne d'inspection des aliments

Afin de situer le contexte, M. Dawson a présenté un aperçu de l'infestation par l'agrile du frêne au Canada. Il a indiqué que le premier cas d'agrile du frêne a été détecté en 2002 dans la ville de Détroit. Quelques mois plus tard, cet insecte a été découvert de l'autre côté de la frontière à Windsor. Il a depuis tué des dizaines de millions de frênes dans 15 États américains et dans différentes municipalités dans le sud de l'Ontario et du Québec, constituant ainsi une menace économique et environnementale pour les zones urbaines et forestières. Dans les premiers jours de l'infestation, l'ACIA a émis un avis d'élimination visant à éradiquer l'insecte au Canada. Depuis, le gouvernement fédéral a réorienté ses efforts vers la gestion de sa propagation. L'objectif de ce forum est de réunir divers points de vue sur la manière de gérer de manière collective ce problème en allant de l'avant en vue de ralentir la propagation de l'agrile du frêne et de protéger les ressources forestières du Canada.

Compte rendu de la journée sur l'agrile du frêne

Jacques Gagnon,
Directeur de la Division de la politique scientifique de Ressources naturelles Canada

M. Gagnon a souligné qu'il y a huit ou dix ans, on disposait de peu d'information sur l'agrile du frêne. Depuis la première infestation, les partenaires fédéraux et plusieurs compétences ont été en mesure de collaborer en vue de partager les travaux de recherche, l'information et les pratiques exemplaires en vue de ralentir la propagation de l'agrile du frêne. Il a mentionné que l'objectif de la rencontre est de poursuivre ces efforts de collaboration et d'établir davantage de partenariats dans le but de mieux comprendre la portée du problème et de continuer à trouver des solutions pour y faire face.

MISE A JOUR DES INITIATIVES DU COMITE SCIENTIFIQUE

Barry Lyons,
Président du comité scientifique et chercheur scientifique à l'analyse spatiale des insectes pour Ressources naturelles Canada

M. Lyons a présenté une mise à jour sur les travaux scientifiques et de recherche actuellement menés sur l'agrile du frêne, ainsi qu'une mise jour sur les récentes initiatives du comité scientifique, dont le rôle consiste à émettre des recommandations axées sur la science à l'ACIA et aux autres organismes sur les aspects réglementaires et en matière de politiques sur la gestion de l'agrile du frêne.

À l'heure actuelle, les travaux de recherche sur l'agrile du frêne portent sur différents niveaux et vont de la génomique à l'organisme, en passant par la population et l'écosystème. L'objectif principal des travaux de recherche est de mettre au point de nouveaux et de meilleurs outils d'atténuation et de détection, et de fournir des travaux de recherche scientifique solides pour appuyer les processus décisionnels visant à s'atteler à la question de l'agrile du frêne au Canada. Les initiatives de recherche actuelles couvrent les domaines suivants :

- Hôte et génomique intégrative d'*Agrilus planipennis*.
- Génomique sensorielle de l'agrile du frêne.
- Chimie de la plante hôte, études sur le choix d'hôte, composants biochimiques de la plante et mécanismes de défense de l'hôte.
- Physiologie de la survie hivernale de l'agrile du frêne.
- Aspects de la composition chimique des phéromones de l'agrile du frêne.

- Échantillonnage des arbres urbains.
- Insecticides systémiques pour la lutte contre l'agrile du frêne.
- Une meilleure lutte biologique contre l'agrile du frêne et une meilleure exploration à l'échelle locale.
- Exploration et exploitation d'entomopathogènes indigènes pour la gestion de l'agrile du frêne au Canada.
- Conséquences écologiques des infestations par l'agrile du frêne.
- Voies d'entrée de l'agrile du frêne causées par l'activité humaine.
- Les répercussions économiques de l'agrile du frêne au Canada.

Point de vue de l'Ontario

Taylor Scarr,
Entomologiste forestier du ministère des Richesses naturelles de l'Ontario

M. Scarr a présenté un point de vue provincial en matière de gestion de l'agrile du frêne. Il a indiqué que le ministère des Richesses naturelles de l'Ontario (MRNO) prévoit à une propagation continue de l'agrile du frêne, occasionnant une augmentation considérable de la mortalité des arbres dans les zones urbaines. Le transport de bois de chauffage et de matériel de pépinières est en majeure partie à l'origine de la propagation de l'agrile du frêne qui présente par ailleurs une avancée moins rapide dans le Nord en raison des basses températures. À long terme, l'ensemble des ressources de frêne en Ontario constitue une source de préoccupation pour le MRNO.

Conformément à la *Loi fédérale sur la protection des végétaux*, le rôle de l'Agence canadienne d'inspection des aliments consiste à protéger la vie des végétaux et les secteurs agricole et forestier de l'économie canadienne. Elle s'y attèle en prévenant l'importation, l'exportation et la propagation des ravageurs en maîtrisant ou en éradiquant les ravageurs au Canada. Toutefois, le fardeau que constitue l'agrile du frêne est trop lourd à porter par un organisme. Les municipalités, les gouvernements provinciaux et le gouvernement fédéral doivent se hisser au rang de chefs de file en vue de s'assurer que les mesures appropriées sont prises pour une mise en quarantaine efficace de l'infestation par l'agrile du frêne et une atténuation de l'incidence de l'agrile du frêne sur les forêts canadiennes. Parmi les composantes d'une stratégie globale relative aux espèces envahissantes, on compte : une évaluation du risque; de la prévention; une détection précoce; une réponse et une éradication rapides; la maîtrise, la gestion et l'évaluation

de la restauration. Le rôle du MRNO est de prodiguer des conseils d'ordre scientifique; de fournir des enquêtes et des instruments de détections; le soutien et le financement du domaine de recherche ainsi que le savoir-faire en gestion forestière.

Depuis la découverte de l'agrile du frêne pour la première fois au Canada en 2002, des progrès considérables ont été réalisés dans la recherche pour comprendre la biologie de l'agrile du frêne, dans la mise au point des outils de détection (pièges à prisme vert et 3Z-hexénol), dans les options de lutte et de lutte biologique contre l'agrile du frêne, et dans l'incidence écologique de l'insecte. Les priorités de recherche actuelles du MRNO en ce qui concerne l'agrile du frêne sont les outils de détection et d'enquête, les produits insecticides pour protéger les arbres, l'évaluation des impacts et la lutte biologique à long terme contre cet organisme.

Même si la lutte contre l'agrile du frêne constitue un défi de taille, il est possible de le relever par le biais de la collaboration et des progrès continus de recherche dans les domaines de la détection, de la maîtrise et de l'incidence de ce phénomène ainsi que des stratégies s'y rattachant.

Point de vue du Quebec

Pierre Therrien,
Ministère des Ressources naturelles et de la Faune du Québec

M. Therrien a fourni un point de vue provincial différent sur la question de l'agrile du frêne. La présentation s'est concentrée sur les principales conclusions depuis la première découverte de l'agrile du frêne au Québec et sur les éventuelles prochaines étapes à suivre pour traiter cette question.

L'agrile a été découvert dans la province de Québec en juin 2008 dans la municipalité de Carignan. Au moment de cette découverte, peu d'arbres étaient infestés sur une zone d'une surface minime et l'infestation datait de moins de cinq ans. En réaction, un effort concerté a été entrepris pour abattre les arbres infectés et ralentir la dispersion naturelle de l'agrile du frêne. Les éventuelles prochaines étapes à prendre en vue de gérer la dispersion de l'agrile du frêne au Québec comprennent 2 volets :

Compte rendu de la journée sur l'agrile du frêne

1. Dans les secteurs infestés par l'agrile du frêne, on doit : maintenir la réglementation; couper les frênes infestés dans les foyers isolés comme celui de Carignan; intensifier les activités de communication pour sensibiliser le grand public; accompagner les municipalités afin de les aider à réduire les impacts de l'agrile du frêne sur leur territoire en les informant sur les essences qui peuvent remplacer le frêne.

2. Dans les secteurs non encore infestés, des efforts de communication auprès des citoyens et des municipalités doivent être faits afin qu'ils comprennent l'importance d'être prêt à l'arrivée de l'agrile du frêne et les inciter à diversifier dès maintenant les essences utilisées pour le reboisement. Les plus petites municipalités auront besoin de plus d'accompagnement. Les inventaires de détection doivent être intensifiés au pourtour des zones réglementées afin de s'assurer de détecter de nouvelles infestations le plus rapidement possible.

L'appui aux activités de recherche sur l'agrile du frêne est important; plus particulièrement celles touchant l'amélioration des méthodes de détection et le développement de nouvelles méthodes de lutte.

Le Québec veut que l'ACIA poursuive son travail de réglementation, intensifie son travail de communication et de détection et considère les particularités régionales dans sa stratégie de gestion de l'agrile du frêne.

En guise de conclusion, il est important de remarquer que la gestion de ce problème complexe demandera une collaboration engageant les diverses parties prenantes. Si les mesures appropriées ne sont pas prises pour ralentir la propagation de l'agrile du frêne au Québec, on estime que 95 % du frêne dans la province sera détruit, occasionnant ainsi des répercussions environnementales et socio économiques graves.

Point de vue municipal

Jason Pollard,
Forestier principal à la Direction des services forestiers de la Ville d'Ottawa

M. Pollard a mis en avant un point de vue municipal sur la question de l'agrile du frêne. En 2008, la Ville d'Ottawa a tenté de déterminer l'ampleur et l'intensité de l'infestation par l'agrile du frêne. Un programme de pièges à prisme vert a été établi en 2009 en vue d'enquêter sur l'ampleur du problème. Avec l'arrivée de l'année 2010, il était clair que l'infestation s'est

propagée dans toutes les directions. Un réseau régional sur la santé des forêts où se sont engagées diverses parties prenantes a été mis en place pour aider à la mise en œuvre d'une stratégie de gestion des organismes nuisibles pour administrer la couverture forestière à Ottawa. Les composantes de la stratégie incluent la plantation d'arbres, l'injection d'insecticides dans les frênes (TreeAzin), l'abattage d'arbres ainsi que la gestion et l'utilisation du bois. La communication constitue également une composante importante de la stratégie, à savoir les mises à jour destinées au conseil municipal, un site Web d'information, les publicités dans les journaux et à la radio, les envois de publicité, les formations, les présentations destinées aux communautés et les messages destinés au milieu rural.

Pour conclure, l'infestation par l'agrile du frêne à Ottawa n'en est qu'à un stade précoce et des efforts et des fonds supplémentaires seront nécessaires au cours des années à venir. La question est complexe, demande un travail laborieux et onéreux, et il est crucial de la soulever devant les décideurs politiques, les dirigeants, les collectivités et les partenaires.

Point de vue de l'industrie

Guy Genest,
Primewood Lumber Inc.

M. Genest a soulevé le point de vue de l'industrie. Il a fait remarquer que les frênes représentent une source importante de bois d'œuvre très demandée par l'industrie des produits forestiers. La présentation s'est focalisée sur les principales répercussions économiques dont a pâti l'industrie du bois de sciage en raison de la propagation continue de l'agrile du frêne en Ontario et au Québec.

En mars 2009, l'Union européenne a introduit de nouvelles réglementations strictes relatives à l'importation du bois d'œuvre causant des répercussions considérables sur le marché de l'exportation du bois d'œuvre canadien. Ces nouvelles réglementations exigent qu'un certificat phytosanitaire soit délivré pour tous les produits ligneux importés au sein de l'UE, garantissant que le bois n'est pas infesté par l'agrile du frêne, dans les 14 jours avant que la cargaison quitte le pays d'origine. Afin de satisfaire à ces nouvelles normes réglementaires, le bois doit soit être équarri en vue de retirer entièrement la surface ronde soit provenir d'une zone connue comme n'étant pas infestée par l'agrile du frêne. En prenant en compte le fait que la zone de quarantaine de l'agrile du frêne est en pleine expansion au Canada, ces nouvelles règlementations sont

dévastatrices pour les entreprises telles que Primewood Lumber, dont les exportations destinées aux marchés étrangers tels que l'UE et les É.-U. représentent 95 % du total de leurs ventes.

Les conséquences de la gestion de l'infestation par l'agrile du frêne ont été de plus en plus onéreuses pour l'industrie du bois de sciage. Par conséquent, l'industrie du bois de sciage est en quête de soutien pour la mise au point d'une nouvelle norme de traitement à fondement scientifique pour le bois nord-américain qui faciliterait la vérification et la certification des produits destinés à l'exportation et garantirait un produit fiable tout en conservant les marchés d'exportation. Elle voudrait que le gouvernement fédéral se positionne comme chef de file en vue de s'assurer que cette norme soit reconnue au Canada, au sein de l'UE et des É.-U.

Le point sur les États-Unis

Paul Chaloux,
Gestionnaire du programme national sur l'agrile du frêne, United States Department of Agriculture, Animal and Plant Health

M. Chaloux a présenté une mise à jour sur les mesures prises en matière d'enquête et de règlement sur l'agrile du frêne aux États-Unis. Il a fait savoir que le programme de réglementation et les activités de sensibilisation des É.-U. minimisent l'effet des schémas de propagation due à l'activité humaine et ont un effet positif sur le ralentissement de la propagation de l'infestation. La présentation s'est concentrée sur les pratiques prometteuses actuellement employées aux É.-U., y compris des installations d'élevage de lutte biologique contre l'agrile du frêne, un laboratoire de dendrochronologie et l'application d'insecticides en fonction de l'âge de l'arbre.

À l'heure actuelle, 270 000 milles carrés dans 15 états sont sous quarantaine fédérale. Les réglementations actuelles englobent l'agrile du frêne, le frêne dans son ensemble, les billes de frêne, le bois d'oeuvre de frêne non traité et le bois non écorcé, les branches et les branches maîtresses, tout bois de chauffage dur, les copeaux de bois non compostés et tout autre produit considéré comme présentant un risque à la propagation de l'agrile du frêne.

Les domaines de recherche prioritaires en ce qui concerne l'agrile du frêne aux États-Unis incluent la génomique, la génétique, la résistance de l'hôte, les outils de traitement et de lutte contre cet organisme nuisible, les impacts écologiques, l'établissement de modèles de propagation de l'agrile du frêne et de meilleures technologies en matière de détection et d'enquête.

Pour de plus amples renseignements, consultez le site : http://www.aphis.usda.gov/ ou http://www.emeraldashborer.info/.

Le point sur le Canada

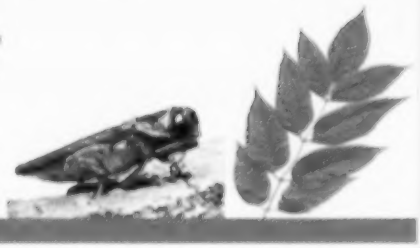
Erin Bullas-Appleton,
Biologiste des enquêtes, Agence canadienne de l'inspection des aliments

Mme Bullas-Appleton a fourni une mise à jour sur les mesures prises en matière d'enquête sur l'agrile du frêne au Canada. Elle a indiqué que le rôle de l'Unité de surveillance phytosanitaire est de planifier, coordonner et administrer le programme d'enquête national sur l'agrile du frêne. Son rôle est de concevoir de nouvelles enquêtes et d'affiner les techniques et les outils d'enquête tout en fournissant des formations et du soutien technique au personnel opérationnel et en assurant la liaison avec d'autres ministères, industries et parties externes.

L'objectif des enquêtes est de détecter les nouvelles voies d'entrée des ravageurs exotiques, de maintenir le statut des zones exemptes de ravageurs et de détecter de nouvelles populations d'organismes nuisibles justiciables de quarantaine. L'objectif visé est également de fournir des renseignements pour soutenir les programmes réglementaires et de fournir une base pour la prise de décisions réglementaires judicieuses à vocation scientifique.

Mme Bullas-Appleton a donné un aperçu des techniques et outils d'enquête qui sont employés et soutenus par l'ACIA, y compris les relevés aériens et terrestres actuels, les relevés de piégeage, l'échantillonnage de branches et la catégorisation du site. Le point central de ces activités réside dans les zones ou l'agrile du frêne est le plus susceptible d'avoir été introduit au moyen des activités humaines, par exemple à travers le transport privé de bois de chauffage et par la voie des pépinières.

Parmi les prochaines étapes à suivre, on compte la poursuite de la stratégie de surveillance de l'agrile du frêne privilégiant diverses tactiques et l'examen de toutes les découvertes jusqu'à



présent en vue d'établir les priorités de manière appropriée. Les protocoles seront également revus dans le but d'intégrer les recommandations du comité scientifique portant sur l'agrile du frêne.

Mireille Marcotte,
Spécialiste des forêts pour l'Agence canadienne d'inspection des aliments

Mme Marcotte a fourni un aperçu de l'approche de l'ACIA relative à l'infestation par l'agrile du frêne; notamment les initiatives de surveillance, de réglementation, d'exécution et de communication et de sensibilisation. Elle a expliqué que l'objectif de l'ACIA est de prévenir la propagation artificielle de l'agrile du frêne au sein de l'Ontario et du Québec et de protéger le reste de l'Ontario, du Québec et du Canada de l'infestation. Les réglementations actuelles relatives à l'agrile du frêne comptent un avis d'interdiction de déplacement hors des propriétés individuelles, des Arrêtés ministériels sur des zones géopolitiques plus importantes, des directives politiques et des certificats de circulation. La *Loi sur la protection des végétaux* et la *Loi sur les sanctions administratives pécuniaires en matière d'agriculture et d'agroalimentaire* sont en place en vue d'assurer la conformité de ces réglementations.

Un des défis que présente l'infestation par l'agrile du frêne est qu'il se déplace naturellement ainsi qu'artificiellement, et ce, par diverses voies. À ce titre, l'ACIA se concentre également sur les programmes de sensibilisation de la communauté, notamment : aviser les résidents dans les zones réglementées des restrictions relatives à la circulation mises en place; informer l'industrie sur ces réglementations et sur les programmes de conformité, sensibiliser le public aux risques que présentent les organismes nuisibles envahissants les forêts et au transport de bois de chauffage qui représente une voie d'entrée à risque de l'organisme nuisible ainsi qu'offrir des formations aux arboristes et aux forestiers sur la biologie, les voies de propagation, les mesures de détection et de lutte contre l'agrile du frêne.

MESURES REGLEMENTAIRES PROPOSEES

L'ACIA envisage la possibilité d'améliorer les mesures de contrôle réglementaire dans le but de réduire la propagation et l'établissement de l'agrile du frêne par l'activité humaine de manière plus efficace.

Compte rendu de la journée sur l'agrile du frêne

Une fois qu'une zone déterminée est déclarée comme infestée, les activités de surveillance cessent dans cette zone de manière à ce que l'ACIA puisse concentrer ses ressources sur une autre zone où l'agrile du frêne n'a pas encore été détecté. Des preuves scientifiques réunies au cours des années de surveillance et de recherche indiquent que bon nombre d'autres frênes se trouvant dans une zone infestée seront également déjà infestés.

S'inspirant de l'histoire et de l'expérience acquise au sujet de l'agrile du frêne en Ontario, l'ACIA envisage l'adoption de mesures réglementaires en vue de répondre aux découvertes les plus récentes en Ontario et au Québec, et de prendre les mesures de protection pour ce qui est du déplacement du matériel potentiellement infecté à partir des zones où il doit encore être détecté. Un deuxième volet réglementaire sur l'Ontario et le Québec pourrait être ajouté en vue de réduire le risque lié à la propagation artificielle de l'agrile du frêne au reste du Canada et des É.-U. La province de l'Ontario et du Québec serait considérée comme une zone à risque en ce qui concerne l'hébergement de populations non détectées d'agrile du frêne, et réglementée par arrêté ministériel, tandis que chaque comté de l'Ontario ou du Québec serait dès lors déclaré infesté et réglementé aux moyens des politiques nécessaires.

En ce qui concerne les produits réglementés provenant de la zone de précaution où l'agrile du frêne n'a pas encore été détecté, des certificats de circulation seraient exigés pour leur déplacement à l'extérieur de l'Ontario et du Québec; par ailleurs aucune restriction ne s'appliquerait à leur déplacement au sein ou entre ces deux provinces. Les enquêtes sur l'agrile du frêne se poursuivraient au sein de la zone de précaution en vue de déterminer l'ampleur de la propagation de l'agrile du frêne en Ontario et au Québec. Cette mesure permettrait d'accélérer l'ajout (ou l'inclusion) de zones nouvellement confirmées comme étant infestées par l'agrile du frêne à la zone infectée. Pour ce qui est des produits réglementés provenant de la zone infectée, des certificats de circulation seraient exigés pour le transport des produits du frêne en dehors de la zone; autrement aucune restriction sur la circulation n'est appliquée au sein de la zone infectée. Après avoir assisté à la présentation des mesures réglementaires proposées, les participants ont posé quelques questions à des fins de clarification.

Compte rendu de la journée sur l'agrile du frêne

Dialogue anime

Dans l'après-midi, les participants à la réunion se sont engagés dans un dialogue animé afin d'émettre des commentaires sur les mesures réglementaires proposées et d'explorer un cadre de gestion de l'agrile du frêne. Les cinq questions suivantes ont été abordées :

1. Quels sont les éléments ou les outils principaux pour gérer la propagation de l'agrile du frêne de manière efficace?
2. Comment l'agrile du frêne vous a-t-il touché jusqu'ici et quelles sont vos principales préoccupations ou questions vis-à-vis des mesures réglementaires proposées?
3. Décrivez un programme qui soutiendrait une stratégie collaborative nationale sur l'agrile du frêne.
4. Qui devraient être les acteurs principaux dans cette stratégie collaborative nationale sur l'agrile du frêne et que devraient être leurs rôles respectifs?
5. Quels sont les autres services et outils que vous aimeriez voir offrir par les organismes fédéraux ou les ministères provinciaux en vue d'aider dans la gestion de l'agrile du frêne?

Les messages principaux suivants ont découlé des discussions :

1. Quels sont les éléments ou les outils principaux pour gérer la propagation de l'agrile du frêne de manière efficace?

La majorité du groupe a convenu que des mesures réglementaires rigoureuses étaient nécessaires en vue de gérer la propagation de l'agrile du frêne. Les participants ont fait remarquer le manque d'application active des mesures actuellement en place et ont souligné l'importance de recueillir et d'analyser les données des résultats de l'application et de l'efficacité de la mise en quarantaine. Ils ont mis l'emphase sur besoin de mettre en œuvre de manière active les nouvelles mesures et d'anticiper cette mise en œuvre active en lançant des initiatives d'information qui visent le public et des compagnes de sensibilisation pour informer ce dernier.

Une communication accrue avec le public sur la question de l'agrile du frêne a été recommandée à travers divers médias, tels que la radio, la télévision et les journaux imprimés afin de toucher une partie considérable de la population canadienne. La nécessité de faire connaître au public les risques et les conséquences du transport du bois de chauffage est un élément central de cette question. L'éducation du public dispensée aux enfants d'âge scolaire a été fortement recommandée. L'utilisation des panneaux de signalisation routière afin de communiquer les efforts précoces de détection et les mesures de gestion au public a été suggérée.

Compte rendu de la journée sur l'agrile du frêne

Bon nombre de participants considéraient que des outils de détection précoce efficaces et des pratiques associées à des stratégies de gestion fonctionnelles constituaient des composantes clés d'une stratégie de gestion de l'agrile du frêne. Le groupe a recommandé d'adopter une approche ciblée fondée sur la situation locale pour déployer les outils de détection précoce dans les zones à risque élevé et augmenter la fréquence de l'échantillonnage, des enquêtes et de la surveillance. À titre d'exemple, il a été proposé d'assouplir la réglementation pour les municipalités qui jouent un rôle plus actif dans la gestion des organismes nuisibles et traiter les cas particuliers différemment en tentant de localiser l'infestation ou de procéder à son éradication. Certains participants ont également suggéré que les provinces pourraient établir leurs propres zones tampons et réguler la circulation.

Il a été recommandé de mettre au point des outils pour les propriétaires, tels que les meilleures pratiques documentées pour la gestion des terres à bois en vue de réduire la présence de l'agrile du frêne. Beaucoup de participants ont également recommandé de mettre au point des options d'élimination des résiduels pour les moulins et les municipalités.

Certains ont mis en avant la nécessité d'une allocation immédiate de fonds pour la recherche et de ressources destinées à une stratégie de gestion de l'agrile du frêne. Ces fonds permettraient : de mettre au point des processus de prise de décision pour les municipalités; d'améliorer les technologies et les outils de détection précoce tels que la capacité de télédétection; de développer de meilleurs systèmes d'inventaire de l'agrile du frêne pour les municipalités et les comtés; d'élaborer des méthodes pratiques pour délimiter une zone d'infestation après sa détection; d'étudier l'attractivité de phéromones; d'utiliser la modélisation de la population en vue de contribuer à une meilleure compréhension de la manière dont l'agrile du frêne agirait dans diverses conditions et dans de nouvelles zones infestées; d'examiner l'incidence des parasites étrangers sur les coléoptères indigènes au Canada et de chercher la résistance chez l'espèce-hôte; mettre au point des outils d'enquête de rechange et développer une capacité de présentation de rapports numériques au public. D'autres ont suggéré que l'approbation des contrôles biologiques au Canada constituerait un moyen crucial de gérer l'infestation.

Une communication renforcée entre tous les partenaires et les parties prenantes a été considérée par la plupart des participants comme une composante essentielle d'une stratégie de gestion de l'agrile du frêne efficace. Cela comprend le partage de l'information et des connaissances ainsi

que le partage des pratiques exemplaires à travers les régions et l'encouragement d'une meilleure compréhension des facteurs et des raisons pour lesquels le bois de chauffage est déplacé pour aller à la source du problème. Les points d'échange et collecte dans toutes les zones à risque élevé, y compris les passages frontaliers et les terrains de camping, ont également été proposés. La mise au point de pratiques exemplaires en ce qui concerne l'introduction du contrôle biologique et l'utilisation des insecticides a également été classée comme étant une composante primordiale d'une stratégie de gestion de l'agrile du frêne.

Certains participants ont suggéré que les possibilités de formation dans le domaine de l'agrile du frêne pour toutes les parties prenantes concernées et des connaissances spécialisées accessibles en matière de gestion forestière seraient fondamentales pour la bonne réussite d'une stratégie de gestion de l'agrile du frêne.

En ce qui concerne la question du commerce, certains représentants de l'industrie ont proposé la négociation d'une acceptation d'un protocole de traitement pour l'exportation du bois de sciage, l'harmonisation des règlements internationaux et la simplification de la certification sur le contrôle biologique.

2. Comment l'agrile du frêne vous a-t-il touché jusqu'ici et quelles sont vos préoccupations ou vos questions principales vis-à-vis des mesures réglementaires proposées?

Certains participants ont avancé que les zones infestées sont trop grandes, ce qui permet le transport du bois et ne ralentit pas la propagation de l'agrile du frêne. Ils ont fait remarquer qu'en vertu des règlementations proposées, les comtés unis de Leeds et Grenville seraient réglementés en raison d'une seule découverte. Les mesures réglementaires proposées étaient par conséquent considérées par certains comme très sévères, lourdes et il a été dit qu'elles auraient une incidence négative sur l'industrie dans chaque province et ce, peut-être sans raison valable. Certains participants ont également pensé que les options proposées créeraient de nouveau une zone de travail opérationnel.

La majorité des participants ont expliqué qu'il serait important d'établir un plan à long terme pour gérer l'agrile du frêne au Canada et de veiller à ce qu'il demeure une priorité politique. Ils étaient préoccupés par le fait que le gouvernement fédéral financerait uniquement les efforts de gestion sur le court terme.

Compte rendu de la journée sur l'agrile du frêne

Même si certains ont laissé entendre que l'agrile du frêne est probablement déjà dans la zone de mise en garde, la mise en place d'une zone tampon plus petite a été recommandée. Il a été conseillé que le développement de la zone tampon soit décidé en fonction de l'âge de l'infestation et de considérer la propagation naturelle et artificielle de l'agrile du frêne. Les participants ont fait part de la nécessité de réaliser davantage d'enquêtes pour veiller à ce que les zones tampons proposées soient décidées sur la base de données scientifiques fiables et de preuves du risque. Une zone tampon dans l'Ouest entre l'Ontario et le Manitoba et une autre pour délimiter la frontière de l'Est entre le Québec et le Nouveau-Brunswick ont été présentées comme étant une possibilité. Certains participants ont recommandé une consultation dans tout le pays en vue de déterminer les incidences des réglementations relatives aux zones tampons au sein de chaque région. Ils ont également recommandé de se pencher sur les zones à l'extérieur de la zone réglementée en vue de préparer les municipalités à de futures infestations de l'agrile du frêne.

La présence de l'agrile du frêne a eu des répercussions considérables sur l'industrie des pépinières à travers le Canada, en particulier en Ontario et au Québec. Certains représentants de l'industrie ont demandé une réduction des répercussions sur le commerce pour l'industrie des pépinières et des parcs à bois débités dans les zones infestées, mais également dans les zones de précautions. Plus précisément, les parties prenantes de l'industrie craignaient de ne pas être en mesure de vendre le matériel de pépinière issu du frêne provenant des zones réglementées aux autres zones et provinces. Ils ont également exprimé leurs inquiétudes concernant des restrictions du marché pour le secteur industriel.

La majorité du groupe a convenu que les mesures réglementaires proposées auraient des répercussions graves sur certaines municipalités; à titre d'exemple, sur la gestion des déchets solides à Toronto. L'incidence écologique et financière d'abattre ces centaines de milliers de frênes a été citée comme étant la plus importante préoccupation dans les mesures réglementaires proposées. Les participants craignaient qu'aucune mesure ne soit prise à l'égard de l'incidence de l'agrile du frêne sur la biodiversité dans la réglementation proposée. La plupart des participants ont également établi la réaffectation du temps et des ressources requises comme étant un problème de taille pour bon nombre de groupes de parties prenantes. En guise d'exemple, certains craignaient que le financement des travaux de recherche ne soit octroyé principalement à l'agrile du frêne au détriment des travaux de recherche sur la résistance

d'autres organismes nuisibles exotiques tels que le chancre du noyer cendré et la maladie corticale du hêtre.

Les participants s'entendaient sur le fait que les mesures réglementaires ne pourront pas constituer un outil efficace sans des données d'enquête, des méthodes de détection rigoureuses et opportunes et une compréhension solide de la manière dont l'agrile du frêne est déplacé par les humains. Certains participants ont exprimé le sentiment que les propriétaires de terre à bois étaient mal informés sur l'agrile du frêne et pourraient être mieux préparés à gérer leur propriété. Il est nécessaire d'accomplir plus d'activités de diffusion à l'extérieur des zones réglementées et de se préparer aux futures découvertes de l'agrile du frêne. Le groupe a suggéré que les campagnes de sensibilisation du public pourraient être plus efficaces que les réglementations pour la gestion des infestations de l'agrile du frêne.

Une poignée des participants a fait remarquer qu'il y avait un ressenti selon lequel l'ACIA ne valorisait pas les efforts déployés par la province de Québec à Carignan. Certains participants étaient également inquiets de voir que les arrêtés actuels ne répondent pas au problème de la propagation à l'échelle nationale. Il a été mentionné qu'un processus plus efficace en termes de temps pour mettre en place les arrêtés était indispensable. D'autres participants ont avancé qu'ils ne disposaient pas de suffisamment données d'enquêtes pour être en mesure de recommander l'orientation de la réglementation proposée et qu'il était difficile d'établir quelle partie prenante serait la plus touchée (p.ex. les municipalités, scieries, etc.). Enfin, il a été indiqué que les réglementations imposées étaient inefficaces en raison du manque d'application et qu'il était fondamental de prendre en considération les réglementations des É.-U.

3. Décrivez un programme qui soutiendrait une stratégie collaborative nationale sur l'agrile du frêne.

Les participants ont décrit un programme qui appuierait une stratégie concertée sur l'agrile du frêne, qui serait menée par l'ACIA et qui se concentrerait sur la prévention collaborative, des stratégies de détection et de gestion entre les parties prenantes aux niveaux fédéral, provincial et municipal.

La majorité du groupe a mis en évidence la nécessité de renforcer l'appui des gouvernements fédéral, provincial et de l'administration municipale, ainsi que les ressources et les fonds qu'ils se sont engagés à allouer pour qu'ils deviennent des éléments essentiels d'une stratégie nationale

concertée pour lutter contre l'agrile du frêne. Une telle stratégie serait pourvue de composantes régionales et internationales, et inclurait une stratégie pour faire face aux cas particuliers.

Une approche concertée à l'échelle nationale devrait comporter une structure de gouvernance centrale, un cadre de gestion intégrée, des priorités déterminées ainsi que des rôles et des responsabilités claires. Les participants ont recommandé d'établir des groupes de travail à un niveau provincial ou régional en vue de fournir de l'appui lorsque cela s'avère nécessaire. Les membres du groupe de travail devraient inclure tous les niveaux de gouvernement, les associations industrielles et les organisations communautaires et le groupe de travail pourrait servir à établir un réseau où toutes les parties prenantes auraient la possibilité de faire part de leur point de vue.

La communication et la coopération entre les régions ont été hissées au rang de priorité pour les parties prenantes présentes, y compris l'engagement à l'échelle municipale. Afin de faciliter la collaboration entre les parties prenantes à l'échelle nationale, les participants ont proposé l'élaboration d'un manuel de l'utilisateur sur la collaboration et l'établissement de structures de gouvernance pour des partenariats stratégiques. Bon nombre de participants ont proposé la désignation d'un coordinateur provincial chargé de la lutte contre l'agrile du frêne en vue de recueillir et de diffuser l'information provenant des municipalités touchées et pour assister les municipalités qui ne sont pas touchées à se préparer à une infestation de l'agrile du frêne.

Certains participants ont suggéré que les efforts déployés pour les enquêtes associés au partage des données pourraient être soutenus par des programmes de recherche concertés et des demandes de recherche et développement conjointes. L'idée d'une mise au point de programmes de détection de l'agrile du frêne et de programmes d'abattage d'arbres à frais partagés a été soutenue par la plupart des participants. Ces derniers ont également recommandé l'élaboration d'options d'élimination rentables pour les secteurs non commerciaux. Certains participants ont proposé l'élaboration de règlements municipaux afin d'abattre les frênes qui présentent un risque dans les propriétés privées.

Les participants ont soumis l'idée selon laquelle fournir du bois de chauffage gratuitement dans les aires de camping et introduire une réglementation régissant les fournisseurs de bois de chauffage en Ontario et au Québec constituerait une composante essentielle de la stratégie nationale concernant l'agrile du frêne.

Parmi les composantes importantes d'une stratégie nationale pour lutter contre l'agrile du frêne, on compte l'introduction d'agents de lutte biologique, une plus grande portée des programmes de sensibilisation, une plus grande délimitation des terres à bois et des forêts et davantage d'enquêtes de détection ainsi qu'un nombre plus important d'employés chargés des enquêtes et de la mise en application de la loi et de la réglementation. Les participants ont indiqué qu'il était nécessaire d'adopter une approche ciblée fondée sur le contexte local et sur une cohérence des messages nationaux au moyen de campagnes de sensibilisation et d'information visant le public. Les parties prenantes de l'industrie ont également conseillé de négocier un traitement pour le bois de sciage et les billes destinés aux marchés et une solution de rechange aux restrictions relatives au bois coupé.

4. Qui devraient être les acteurs principaux dans cette stratégie collaborative nationale sur l'agrile du frêne et que devraient être leurs rôles respectifs?

Gouvernement fédéral

Les participants ont mis en lumière le fait que la gestion forestière au Canada constitue une responsabilité partagée entre les gouvernements fédéral et provincial. Le défi que représente l'agrile du frêne au Canada est une question horizontale qui exige l'engagement et la coordination de plusieurs ministères et organismes fédéraux. La majorité des participants ont estimé que le leadership pour une stratégie nationale de lutte contre l'agrile du frêne, y compris les aspects relatifs à la prévention, la détection et l'atténuation des risques, devait être incarné par l'Agence canadienne d'inspection des aliments, en collaboration avec les gouvernements provinciaux et territoriaux. Les participants ont étayé l'idée que l'ACIA devait octroyer davantage de ressources financières en vue de permettre l'atténuation de l'incidence de l'agrile du frêne, notamment pour soutenir la mise au point de nouveaux outils d'enquête. Il a également été proposé que l'ACIA offre des options administratives plus efficaces pour appuyer leur mandat.

En outre, le gouvernement fédéral a été considéré comme responsable de toutes les questions en matière de commerce international : bon nombre de participants ont observé qu'il incombait à l'ACIA d'élaborer les réglementations appropriées en collaboration avec les partenaires de recherche à l'échelle internationale.

Les participants étaient d'avis que Parcs Canada et le Service canadien des forêts étaient en mesure de contribuer par leur expertise sur les ressources forestières, par leurs travaux de recherche scientifique et par la diffusion de l'information au public, alors que l'expertise spécifique dans le domaine de la réglementation du contrôle biologique découlerait de l'Agence de réglementation de la lutte antiparasitaire. Ces organisations offriraient autant de connaissances scientifiques que possible aux comités composes par les parties prenantes. D'autres agences fourniraient un appui en nature et des ressources financières.

Il est important de retenir qu'un nombre significatif de participants a considéré que le soutien continu et l'engagement financier des ministres fédéraux crucial pour une gestion de l'agrile du frêne couronnée de succès. La majorité s'est prononcée pour des engagements de financement à long terme (plus de 5 ans) pour la recherche et développement, les communications, les programmes de contrôle et d'éradication, tout particulièrement au sein des populations présentant des cas particuliers.

Gouvernements provinciaux et territoriaux

Les gouvernements provinciaux et territoriaux étant chargés de la gestion des forêts naturelles et de programmes de gestion des organismes nuisibles, il a été observé que les provinces et les territoires jouaient un rôle essentiel dans l'éradication, le confinement et le contrôle de l'agrile du frêne, en déployant des efforts particuliers dans la réalisation d'enquêtes, la surveillance de la population et la sensibilisation. Certains participants ont défendu l'idée que les provinces devraient intensifier et édicter des réglementations visant à gérer l'agrile du frêne et que le ministère de l'Agriculture, de l'Alimentation et des Affaires rurales de l'Ontario devrait jouer un rôle plus important étant donné qu'une grande majorité des arbres touchés se trouvaient ou se trouveront dans les zones rurales. Cela demande la collaboration des ministères provinciaux, territoriaux et fédéraux dans les secteurs de la foresterie, des parcs et des transports. À titre d'exemple, le ministère des Richesses naturelles de l'Ontario a été considéré comme étant apte à fournir l'expertise en matière de gestion des forêts, des conseils d'ordre scientifique, des enquêtes poussées et des outils de détection ainsi que le soutien au domaine de la recherche et le financement.

Les participants ont constaté que le rôle du ministère des Transports pourrait se résumer à sa contribution par des données sur les tendances des services de transports d'un certain nombre de voies commerciales qui relèvent de la compétence de la province.

Une partie des participants a recommandé la désignation d'un coordinateur provincial chargé de la lutte contre l'agrile du frêne pour recueillir l'information, faire office d'agent de liaison avec les municipalités et aider à gérer les efforts de communication. Le coordinateur offrirait son assistance aux municipalités actuellement exemptes de l'agrile du frêne dans leur préparation contre une possible infestation à l'avenir.

Municipalités

Il a été observé que les municipalités jouaient un rôle déterminant dans la détection et la gestion de l'agrile du frêne dans les zones urbaines, en particulier en ce qui concerne la gestion des arbres qui bordent les rues, les initiatives d'information destinées au public et les enquêtes. Un nombre considérable de participants ont observé qu'une collaboration renforcée serait requise entre les provinces, les municipalités et les propriétaires privés; par exemple, en vue de fournir une aide relative à l'élimination aux propriétaires. Les participants ont constaté que des municipalités de petite taille ne seraient pas en mesure de bénéficier de programmes de contrôle et devront faire appel au financement à des niveaux plus élevés du gouvernement.

Certains étaient d'avis que l'Association des municipalités de l'Ontario constituait un acteur incontournable lorsqu'il était question de fournir des outils et de l'information aux municipalités et de diffuser l'information au public.

Groupes constitués des parties prenantes

D'autres groupes de parties prenantes ont également été considérés comme des acteurs clés dans la réponse à apporter à la menace que constitue l'agrile du frêne. Ces groupes constitués des parties prenantes comprennent le secteur et les associations industriels, la communauté universitaire, les organisations non gouvernementales et le grand public.

L'industrie et les associations forestières, y compris les producteurs de bois, les associations de terrains boisés et les associations des produits forestiers du Canada, jouent un rôle primordial en appuyant le réseautage, la communication, la conformité, l'éducation et la recherche. En outre,

l'industrie horticole a été jugée comme en mesure de fournir le leadership et les connaissances dans le domaine de la sélection.

Bon nombre de participants ont fait référence au fait que le rôle de la communauté universitaire est de fournir des travaux de recherche, un leadership scientifique et des connaissances de base solides.

De plus, les participants ont relevé que les organisations non gouvernementales ont un rôle de taille à jouer dans les domaines de la communication et de la diffusion de l'information au public. S'inspirer des efforts de diffusion de l'information déployés actuellement aux É.-U. permettrait d'aller de l'avant avec cette initiative.

Le grand public, à l'instar des propriétaires des terres à bois, des propriétaires de maisons, des campeurs et des groupes de naturalisme, représentent également des acteurs incontournables dans la gestion de l'agrile du frêne. Leurs rôles et leurs responsabilités incluent la conformité, la diffusion de l'information au public et la gestion des arbres. Les participants ont constaté que les services de loisirs extérieurs devaient également s'impliquer davantage.

5. Quels sont les autres services et outils que vous aimeriez voir offrir par les organismes fédéraux ou les ministères provinciaux en vue d'aider dans la gestion de l'agrile du frêne?

- Soutien ou subvention pour l'élimination des arbres.
- Fournir (ou subventionner) du bois de chauffage gratuitement sur les sites de camping.
- Aider les propriétaires de terrains à assumer le coût de l'élimination des arbres (p. ex. réduction d'impôt).
- Systèmes d'appui au processus de prise de décision pour les municipalités.
- Aider de plus petites municipalités (p. ex. financement, expertise, inventaires des arbres, plantation des arbres).
- Financer les provinces et les municipalités dans les opérations de détection, de surveillance, d'enquête, d'intervention et de contrôle.
- Être en mesure de déterminer l'âge des infestations en vue de prendre des décisions mieux informées.

- Développer les zones tampons – tenir compte de la propagation naturelle et artificielle, de l'âge de l'infestation et du besoin ou de la valeur : des zones plus petites, mais avec une gestion renforcée.
- Introduction des outils du contrôle biologique.
- Investir dans la recherche et le développement de souches résistantes de frêne.
- Recommandation pour assortir les arbres et les sites à des fins de gestion des arbres urbains.
- Améliorer l'information et la sensibilisation sur les options d'atténuation pour toutes les parties concernées appropriées.
- Conception de plus de matériel de communication destiné au grand public.
- Conseil et expertise pour les gestionnaires forestiers.
- Utilisation des médias sociaux pour faire passer le message.
- Stratégie de marketing pour les produits du frêne.
- Étude du marché pour déterminer de plus efficaces stratégies de communication au public.
- Réglementation des fournisseurs de bois de chauffage en Ontario et au Québec.
- Souligner les rôles et les responsabilités des gouvernements fédéral, provinciaux et territoriaux.
- Enquêtes aériennes portant sur un nombre plus large de zones et de terrains boisés contigus.
- Nouvelles mesures en vue de mettre à jour les données reconnues d'infestation.
- Outils de gestion collaborative.
- Soutien à l'exportation de l'industrie du bois de sciage à l'UE.
- Un manuel d'utilisateur soulignant les pratiques exemplaires relatives à la gestion des arbres et aux connaissances pratiques de la manière dont on gère l'infestation à l'intention des plus petites municipalités et des propriétaires de terrains.
- Des programmes à long terme (5 à 10 ans) et des engagements de financement durable pour assurer la stabilité et la prédictibilité.
- Soutien continu aux programmes actuellement en place.
- Les spécialistes de gestion de l'agrile du frêne doivent coordonner leurs efforts.
- Réseaux de communication municipale.

- Changement législatif en vue de clarifier les rôles et les intentions visées par la Loi.
- Outils pour simplifier la gestion de l'agrile du frêne.
- Communication proactive des limites administratives des zones réglementées.
- Efforts de communication au nom des partenaires fédéraux et provinciaux afin de veiller à ce que les municipalités comprennent les options et les outils à leur disposition.
- Mise en évidence générale des approches plus proactives.
- Outils pour détecter les parasitoïdes indigènes semblables à ceux mis au point aux É.-.
- Techniques de détection et de surveillance qui sont rapides, efficaces et coordonnées.
- Outils pour déterminer l'âge des infestations en vue de mieux informer les preneurs de décision.
- Financement prioritaire pour les projets de recherche dont les livrables seront disponibles dans 1 à 2 ans.
- Outils de gestion des organismes nuisibles pour une utilisation immédiate.
- Compensation pour l'abattage d'arbres ou pour les traitements au moyen des crédits d'impôt.
- Recommandations sylvicoles pour les gestionnaires des forêts.

Mot de la fin

Marcel Dawson,
Agence canadienne d'inspection des aliments

M. Dawson a remercié les personnes présentes pour leur participation et a souligné l'importance de la mise en commun des ressources et d'expertise en vue de continuer le dialogue sur la meilleure façon d'aller de l'avant pour élaborer une approche de gestion collaborative de l'agrile du frêne. Il a indiqué qu'on en est qu'au début – à partir de maintenant jusqu'à la fin du mois de janvier, l'ACIA continuera à communiquer avec les parties concernées en vue d'avoir leur point de vue et leur soutien. Au cours de la nouvelle année, une décision sera prise en ce qui concerne l'approche à prendre relativement à l'établissement des zones réglementées et des priorités pour aller de l'avant. Si vous avez d'autres questions, des idées ou des commentaires, veuillez nous en faire part par courriel à l'adresse suivante :
EAB@inspection.gc.ca.

ANNEXE A

Journée de l'agrile du frêne

Le 2 décembre 2010
Salle de bal Chaudière, Château Cartier, Gatineau, Québec

8 h 00 **Inscription**
Président : *Marcel Dawson, Agence canadienne d'inspection des aliments*

9 h 00 **Présentation et mot de bienvenue**
Marcel Dawson, Agence canadienne d'inspection des aliments
Jacques Gagnon, Ressources naturelles Canada, Service canadien des forêts

9 h 10 **Mise à jour des initiatives du comité scientifique**
Barry Lyons, Ressources naturelles Canada, Service canadien des forêts

9 h 30 **Point de vue de l'Ontario**
Taylor Scarr, Ministère des Richesses naturelles de l'Ontario

9 h 50 **Point de vue du Québec**
Pierre Therrien, Ministère des Ressources naturelles et de la Faune du Québec

10 h 10 **Pause**

10 h 40 **Point de vue des municipalités**
Jason Pollard, Ville d'Ottawa

11 h 00 **Point de vue de l'industrie**
Guy Genest, Primewood Lumber

11 h 20 **Le point sur les États-Unis – Mesures réglementaires et d'enquête**
Paul Chaloux, United States Department of Agriculture, Animal and Plant Health

11 h 40 **Le point sur le Canada – Mesures réglementaires et d'enquête**
Mireille Marcotte, Agence canadienne d'inspection des aliments
Erin Bullas-Appleton, Agence canadienne d'inspection des aliments

12 h 00 **Dîner**

13 h 00 **Séance animée – Défis et solutions relatifs à la gestion efficace de l'agrile du frêne (Présentation et discussions)**

14 h 30 **Pause**

15 h 00 **Discussions et comptes rendus informels portant sur les points abordés au cours de la séance animée et commentaires de clôture**

16 h 00 **Levée de la séance**